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BUREAU OF LAND MANAGEMENT
NEW YORK OUTER CONTINENTAL SHELF OFFICE

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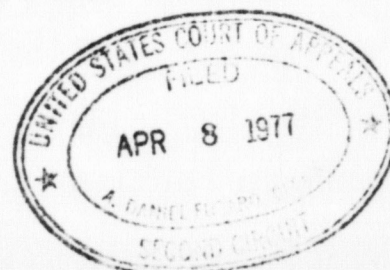
TECHNICAL PAPER NUMBER

EXHIBIT



ECONOMIC STUDY OF THE POSSIBLE IMPACTS
OF A
POTENTIAL BALTIMORE CANYON SALE

DECEMBER 1975



This technical paper reconstructs the utilization of two related models by the New York Outer Continental Shelf Office to analyze the economic effects of a proposed OCS lease sale in the Mid-Atlantic area and to ascertain the potential for affecting air and water quality.

The choice of specific areas is not a determination by the New York OCS Office staff as to the actual location of required facilities. Rather, specific locations were required to utilize the models in question and those chosen were considered representative of the range of circumstances that might be encountered throughout the Mid-Atlantic area.

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INTRODUCTION

This study concerns itself with the possible onshore impacts that the potential leasing of the Baltimore Canyon Outer Continental Shelf (Sale Number 40) could have on the Mid-Atlantic coastal region. The purpose of the study is to provide the reader with an understanding of the extent of the impacts that could be expected should the proposed sale occur. It is also the purpose of the study to flag some of the potential onshore problems that could stem from the proposed sale and provide a greater understanding of the factors that could determine the possible socio-economic impacts.

The study is based on an application of a Multiregional Multi-industry forecasting model that has been developed by Dr. Curtis C. Harris, Jr. of the University of Maryland. For the remainder of the study, the Harris model shall be referred to as the economic model. In reviewing a book written by Dr. Harris on the economic model, the Journal of Economic Literature has said:

The work addresses an important void in the literature. Its basic modeling approach is sound, and it rests on an impressively thorough empirical base.

The economic model has been operational for several years. It has been previously applied by Dr. Thomas Grigalunas of the University of Rhode Island in assessing the potential impacts of Georges Bank exploration, development, and production on the New England region.¹ Another major application of the economic model was made by the Federal Highway Administration in a study analyzing the regional economic

¹See Thomas A. Grigalunas, Offshore Petroleum and New England, University of Rhode Island, Kingston, Rhode Island, 1975.

effects of alternative highway systems.¹ Further application of the economic model has been made by a study designed to trace the economic effects of locating strip mining coal production in Montana.² The economic model has also been used to study natural gas curtailment in Maryland.³ Impacts of the Public Employment Program on the economies of select areas were analyzed using the economic model.⁴ An additional application of the economic model was made to study the impact of reduced agricultural production on the Southwest.⁵ A Canadian version of the model is being developed by the Ministry of State Urban Affairs in Ottawa, Canada. The model should be completed by the summer of 1976.

¹See Curtis C. Harris, Jr., The Regional Economic Effects of Alternative Highway Systems, Ballinger Publishing Company, Ballinger Publishing Company, Cambridge, Massachusetts, 1974.

²Anthony C. Fisher and John Krutilla, "A Preliminary Investigation of the Economic, Demographic and Fiscal Impacts of Eastern Montana Coal Development." Paper presented at the Regional Science Association Meetings, Cambridge, Massachusetts, November 7-9, 1975.

³William A. Donnolly and Ali M. Parhizgari, "Estimating the Regional Impacts of Energy Shortages." Paper presented at the International Regional Science Conference on Energy and Environment in Louvain, Belgium, May 1975.

⁴"An Evaluation of the Economic Impact Project of the Public Employment Program." Final Report by the National Planning Association to the U.S. Department of Labor, Manpower Administration, Office of Policy, Evaluation and Research.

⁵W.L. Harris et al., "Application of Solar Energy in Agriculture: A Research Program." Report to the Agriculture Research Service, forthcoming December 1975.

For purposes of this study, a scenario is hypothesized for input into the economic model. Information needed to formulate an actual development-production plan is not available until after drilling commences. It is only at this point that such a plan can be formulated. The assumptions presented for use in the economic model are not based on an actual development-production plan. For purposes of a pre-drilling study, a scenario is hypothesized that represents one of many possible scenarios that could be considered reasonable.

It is used as input into a predictive model only to suggest the impacts that a given scenario may have. The economic model is not predicting what will happen but could do so once an actual development-production plan was formulated. It is only suggesting what could happen given the hypothetical scenario that was developed. Results of the economic model should not be taken as a policy statement and are in no way urging or implying that an actual development-production plan to be formulated in the future should or will contain the factors of the hypothesized scenario used for the economic model.

The Mid-Atlantic coastal region is a frontier area in that no previous OCS lease sales have been held in the region. The need for a more rigorous framework with which to assess the possible socio-economic impacts of a potential Baltimore Canyon sale has become apparent. Each region within the United States is unique with regard to its existing economic structure. The impacts that could be expected from the possible introduction of offshore operations vary with the input-output relationships and industrial linkages that are found in differing areas. Many of the activities needed to support new investment activity in the Gulf of Mexico, for example, can already be found to exist in that area.

The same investment in a frontier area such as the Mid-Atlantic coastal region would induce substantially different onshore impacts. The economic model is used to capture the existing economic structure of a region and trace the impacts of a given scenario through the economy of the region in a consistent manner. In so doing, the extent of the impacts, potential problems, and factors determining the impacts can be identified.

While some readers may disagree with the set of assumptions used and have inherent difficulty with the concept of using an economic model to assess the possible future onshore impacts of the potential sale, the results of the economic model have been found to be quite reasonable given the assumptions used.

It is hoped that the methodology used will be considered as a beginning and further refinements, improvements, and adaptations can be made by users as greater certainty becomes available over time. This methodology should become more useful should development-production plans come into being and cost data become better known over time. Models of field activity could possibly be utilized for input into the economic model. Coefficients and relationships within the economic model could be adapted and changed to more accurately describe a given situation should more perfect knowledge become available. The output of the economic model could be used by planners as input into other models to further analyze the potential impacts.

The methodology used adds rigor to the way in which socio-economic

impacts have been assessed in the past. The analyst is forced to explicitly consider the activities involved in exploring, developing, and producing offshore oil and gas and trace the actual flow of these resources to onshore areas. It is hoped that in so doing a better understanding of the possible socio-economic impacts can be gained. This methodology could prove useful in other resource leasing programs and other potential leasing areas of the OCS.

The study is divided into four chapters. Chapter I describes the economic model used. Chapter II describes the assumptions used as input into the economic model. Chapter III provides the results of the economic model as well as an analysis of the model's output. Chapter IV describes an application of the economic model's results in the assessment of the possible level of air and water pollution emissions in four primary impacted counties that is consistent with the level of economic activity resulting from the hypothesized scenario. A final section summarizes the findings of the economic study.

It should be remembered that economic data does not include all values that society may deem to be important. Economic data measures production and not social welfare. It is suggested that the results of the economic model be used as just one of the important social indicators. In reaching a decision with regard to the leasing of the Baltimore Canyon Outer Continental Shelf, other social goals must be weighed against the goal of reaching a high level of gross regional product. With this in mind, the results of the economic model can be studied and analyzed in their proper perspective.

CHAPTER I

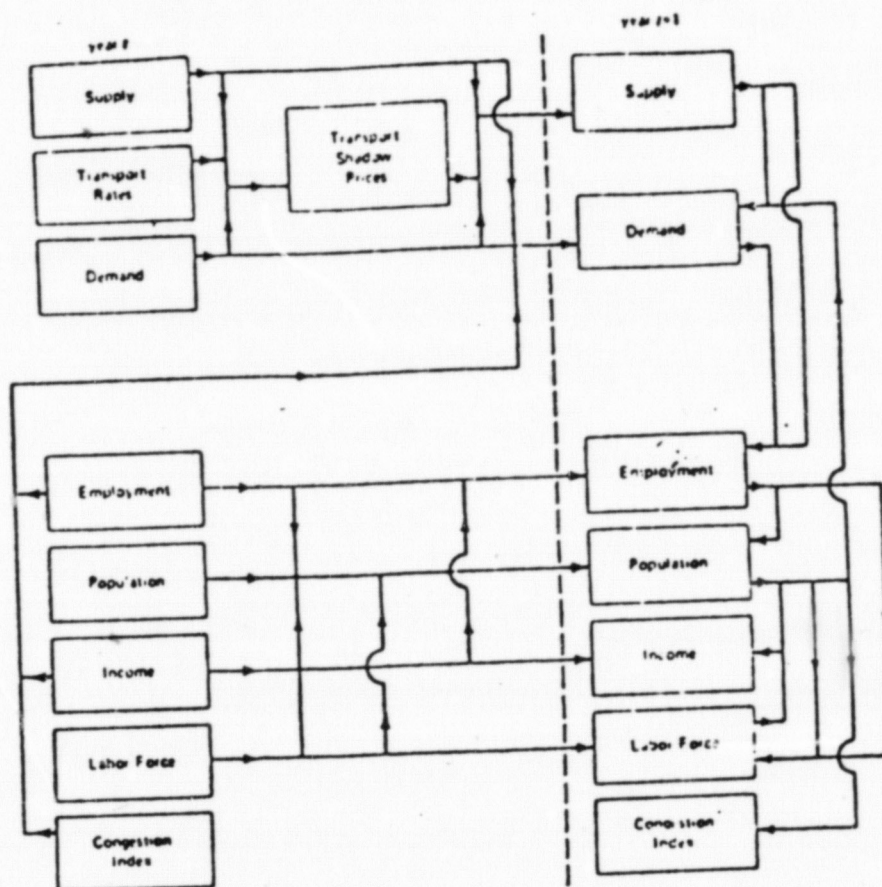
THE ECONOMIC MODEL

The economic model assumes that changes in industry location are the driving force that determines the economic growth or decline of a region. Regional output changes cause changes in employment and income which in turn affect the regional demand for goods. The changing location of demand and supply affect the factor costs and competitive position of one region relative to others. The model's strength lies in its ability to trace regional economic impacts of exogenous changes of such variables as output, investment, and employment. It is first run with the variables forecast endogenously and then rerun with variables set to predetermined levels. Impacts are measured by comparing the runs.

The economic model begins by forecasting the location of each industry. The change in output of each industry sector is explained by: 1) input prices that firms face in each location, and 2) agglomeration variables which include demand for product in a region and amount of inputs imported to a region. After output is determined, employment, population, earnings, and personal income are derived. Final demand is then derived. This final demand includes consumption, investment, government expenditures, and exports less imports. The model is recursive in that supply and the demand data in the year t is used to forecast variables in/year $t + 1$. The forecasts are then used as data to make forecasts for the year $t + 2$.

A simplified flow chart of the economic model is presented in Figure 1.

Figure 1
Simplified Flow Chart of Economic Model



The left hand side of the flowchart itemizes the data and computations for the year t .

The connecting lines show how the data is used to make forecasts in the year $t + 1$. After $t + 1$ forecasts are made they are realigned as data, as given in the left hand side of the flowchart, in order to forecast for the year $t + 2$. In any given year, predetermined changes may be made in the data.

In the present state of the economic model's development greater than one thousand data items are used for each county in the United States. These data items are listed in Table 1.

Table 1
Data Items

<u>Regional Data Item</u>	<u>Number of Sectors</u>
Industry Output	99
Industry Employment (jobs)	103
Industry Earnings (wages)	103
Equipment Purchases	69
Type of Construction	28
General Government	7
Defense Expenditures	99
Personal Consumer Expenditures	99
Foreign Exports	99
Foreign Imports	102
Population by Age and Race	8
Births	2
Deaths	8
Multi-job Holders	1
Net Commuters	1
Civilian Person Employed	1
Civilian Labor Force	1
Civilian Unemployment	1
Personal Income	4
Value of Land	1
Marginal Transport Cost of Shipping Output	74
Marginal Transport Cost of Obtaining Inputs	74
Total Demand	99
	1,083
<u>National Coefficients Matrices</u>	
Input-Output Technical	99 x 99
Construction	28 x 99
Equipment	69 x 99
Government	7 x 99
Pollution Emissions	8 x 104
Energy Requirements	5 x 116

Many of these data, in their present form, have been estimated from other data. For example, in order to derive population migration it was necessary to use birth and death data to estimate county population by age and race group. The improvement of data estimating procedures and the updating of data is an ongoing process for the economic model.

A complete description of the data, estimating procedures and relationships existing within the model are found in:

Harris, Curtis C., Jr. The Urban Economies, 1985
Lexington, Massachusetts: D.C. Heath and Company,
1973.

Harris, Curtis C., Jr. and Frank E. Hopkins.
Location Analysis, Lexington, Massachusetts:
D.C. Heath and Company, 1973.

The reader is encouraged to review the above sources in order to gain a more thorough understanding of the nature of the economic model. For our purposes a discussion of the relationships found in the economic model and some of the key aspects of the economic model relevant to our application are presented.

Changes in industry output have been modeled to be a function of locational rents, the value of land, the existence of capital stock, the location of demand, and the availability of inputs. It is reasonable to say that firms in certain locations could achieve higher profits than they would if they were located elsewhere. A firm making higher profits than other firms in the same industry because of its locational advantage is said to be receiving locational rents. Those marginal firms not receiving locational rents may have an incentive to move closer to the market. Locational rent may stem from regional differences in wage rates, transportation costs of products to market, and transportation costs of

obtaining inputs for use in the productive processes.

It is quite possible, however, that firms with a locational advantage may not actually realize locational rents. The cost of land may in fact reflect its locational advantage and a firm with this favorable location might not receive any excess profits. All land values represent the present value of the future income stream associated with the land. A firm could either pay a landlord the rent or pay the equivalent in the form of a purchase price. Land markets are not always competitive. Few buyers may have interest in a given parcel of land. Some parcels of land are unique with regard to the nature of the land and/or the zoning laws affecting its use. A firm would do well to consider not paying the landlord the full locational rent. By choosing a site with the lowest market value, a firm could retain a portion of its locational rents. In the economic model, the market value of the land is used as an indicator of the distribution of locational rent between firm and landlord. If land rents were the same, a firm would choose locations with the highest locational rent. If land rents were not the same, firms would choose locations with low market rents. The lower the rent the more attractive the area would be for increases in output.

A firm that is located in an area has fixed plant and equipment that depreciate over time. The costs of relocation are often high and may prohibit the immediate locational realignment of firms. The older the existing firm, the more likely it is that the firm would change locations. Increases in output by region occur in favorable locations while decreases in output occur in less favorable locations.

The latter is influenced by the rate of depreciation. Data on the amount and age of capital stock by region is not available. Equipment purchases is used as a proxy for net investment. The level of supply serves as a proxy for capital stock. It also serves as an agglomeration variable in that it may represent a competing supply for a certain output. In addition to transportation costs of shipping products and obtaining inputs, other costs may be associated with the selling of products and the obtaining of inputs. Nearness to buyers or sellers may decrease uncertainty or increase communication. These agglomeration effects are represented by the demand for the product (intermediate and final) and the input scarcity (dollar amount of inputs imported into the region). Transportation costs are computed with a linear programming algorithm.

Equipment purchases by sector and industrial construction are forecast by relating them to changes in output by sector. Private household construction is related to personal income of the previous period, and public construction by type is related to personal income and the appropriate type of government expenditures. Large increases in output cannot take place without additional gross investment. There are 69 equipment purchasing sectors, 17 private construction sectors, and 11 public construction sectors.

Employment by industry is forecast by relating it to the appropriate projected output and equipment purchases. Equipment is often purchased to replace labor. With the level of output calculated, the greater the amount of equipment purchases, the fewer the number of employees. Government employment is forecast by relating it to government expenditures. Employment by industry is the number of jobs by industry located at the place of work. The number of persons employed by place of residence is obtained by adjusting the number of jobs by the number of multi-job holders and by the number of commuters.

Population changes are caused by births, deaths, and migration. Births and deaths are forecast by applying birth and death rates to the previous year's population. Migration is forecast by relating it to changes in civilian persons employed by place of residence, by the amount of labor surplus in an area, by the changes in military employment, and by the wage rate. Surplus labor is measured by applying the National unemployment rate to the area's employment to find out what the area's labor force would be if it had the National employment rate. The difference between the actual labor force and this figure is the amount of labor surplus or deficit. Population from labor force surplus areas migrates into labor deficit areas. Population is attracted to areas with large employment changes and high wage rates.

Labor force can be predicted by relating it to population and the amount of labor surplus. Persons enter and leave the labor force in response to the availability of jobs. The higher the labor surplus of an area the lower the expected labor force participation rate, assuming other things

that influence labor force participation rate are held constant. The amount of unemployment is derived by subtracting the number of civilian persons employed from the number of civilian persons in the labor force.

Personal income is defined as the sum of earnings, transfer payments, and property income minus the amount of social insurance payments made by employees. Earnings by industry are forecast by relating them to the forecast employment and equipment purchases. Equipment purchases can affect the wage rate as well as the amount of employment, but the direction of the wage rate changes is not always certain. In some industries the greater the productivity of equipment purchases the greater the ability of labor to demand higher wages. In other industries greater productivity of equipment could decrease the need for skilled labor and decrease the average wage rate. To derive the amount of earnings by place of residence, total earnings in all industries are adjusted by the number of commuters. Transfer payments mostly consist of pensions, unemployment benefits, and welfare payments and are forecast by relating them to the amount of population and the amount of unemployment. Property income mostly consists of rents, interest, and dividends and is forecast by relating it to earnings. Once personal income has been derived, it is used to forecast personal consumption expenditures by industry sector.

Total supply is the sum of domestic output plus the amount of competing imports measured at the port of entry. Total demand is the sum of intermediate demand and final demand. Intermediate demand for each

industry is estimated by applying national input-output technical coefficients to the amount of domestic output. National coefficients are applied to the equipment purchases, construction expenditures, and government expenditures in order to derive these components of final demand. Personal consumption expenditure by industry, defense expenditures, and foreign exports measured by port of departure are added to obtain total demand.

The sum of the regional forecasts are controlled to the National forecasts of an input-output model developed by Dr. Clopper Almon of the University of Maryland. It was used by the Federal Energy Administration in doing its economic analysis for Project Independence and is presently being used by the Environmental Protection Agency in its Strategic Environmental Assessment System (SEAS) model as a basis for the regional breakdown of effluents. A thorough explanation of the Clopper Almon model can be found in:

Almon, Clopper, Jr. 1985: Interindustry Forecasts of the American Economy, Lexington, Massachusetts: D.C. Heath and Company, 1974.

An input-output model traces the flows of all products produced and sold. Output from a given industry may be bought and used for production in another industry. It may also become a component of the gross national product (GNP) through sales to capital equipment investment, sales to Federal, State, and local government, inventory change, personal consumption, plus exports minus imports. Categorizing the components of GNP as final demand, we can use the following notation to represent the input-output system:

X = Total output
 D = Final demand
 A = Technical coefficients of production

The technical coefficients of production represent the amount of output needed from an industry to produce one unit of output in another industry. If the X s are total output in a particular industry and D s are final demand, we can write the following system of equations:

$$X_1 = A_{11} X_1 + A_{12} X_2 + \dots + A_{1n} X_n + D_1$$

$$X_2 = A_{21} X_1 + A_{22} X_2 + \dots + A_{2n} X_n + D_2$$

$\vdots$
 $\vdots$
 $\vdots$
 $\vdots$
 $\vdots$

$$X_n = A_{n1} X_1 + A_{n2} X_2 + \dots + A_{nn} X_n + D_n$$

This system of equations simply states that output in each industry is equal to the amount of its product going to all other industries plus the amount going to final demand.

Using matrix notation, we can see how total output in each industry can be obtained when final demand and the technical coefficients of production are known:

$$X = AX + D$$

$$X - AX = D$$

$$(I - A) X = D$$

$$X = (I - A)^{-1} D$$

While the Harris economic model is not an input-output model, it does make use of input-output relationships to capture linkages among industries in a region. Autonomous changes in the components of final demand that stem from the location of new economic activity in a region, affect the output of an area's industries.

These relationships are expressed by the inter-industry coefficients used in the economic model. National control totals are established for economic variables in total and by industry. The economic model allocates shares of these National values to all geographic areas within the United States based on the existing economic structure of the areas and the estimated economic relationships. Forecasts for the industries in an area are therefore consistent with regard to expected National and regional trends. Operating within this consistency, the economic model attempts to reflect the extent to which the growth in one industry could attract new activity, expand existing industrial activity, or decrease industrial activity due to a competition for resources.

Presently, coefficients in the economic model were estimated using data for 1965 and 1966. The economic model does include data up to the year 1970. The complete 1970 information is a combination of actual data and forecasts. Additional data would allow substantial improvement in the equations of the economic model. If more than two years of data were available, more appropriate lag structures could be specified

in the equations, and time series and cross section of data could be pooled for estimating parameters. Also, in the equations it would be possible to separate the unexplained portion of a variable into a unique constant component and a random influence component.

In addition to obtaining more recent data it would also be useful to utilize better estimates of resource requirements and resource availability. Presently the economic model assumes the supply of resources from existing locations is unlimited and that new locations are not exploited. However, if the coal supply in Pennsylvania, for example, were to be exhausted, then it would be useful to enter this information in the model so that coal supplies could be developed elsewhere in the nation. The economic model makes some use of National coefficients on energy requirements, but it would be useful to estimate coefficients by region, since they would have considerable regional variation. Also, it would be useful to have data on the non-fuel mineral resources. The model uses National pollution emission coefficients. In addition it would be beneficial to utilize information of pollution treatment levels and treatment costs since these costs would have an effect on the regional forecasts.

The economic model could be expanded in a number of directions, such as: 1) the inclusion of passenger travel data and equations into the model so that better forecasts can be made for travel-dependent regions, 2) the inclusion of land-use and water-use information so that land and

water constraints can be entered into the model, and 3) inclusion of tax revenue data and equations for all levels of government, and the expansion of detail on government expenditures by function so that the economic model can be used to measure the fiscal impacts of economic development.

Our application of the economic model has utilized the presently realized capability of the economic model as developed to date.

The use of the economic model has allowed us to perform a consistent impact analysis in that the cases studied reflect the same assumptions with regard to economic behavioral relationships. With the description of the economic model provided in Chapter I as a background, the reader can now turn to Chapter II where the application of the economic model is discussed.

CHAPTER II

APPLICATION OF THE ECONOMIC MODEL

Our use of the economic model concerns itself with estimating what impacts the potential leasing of portions of the Baltimore Canyon Outer Continental Shelf (proposed Sale Number 40) could have on the Mid-Atlantic coastal region up to the time of peak production in 1990 and is specific to the onshore effects of offshore activity. The economic model projects economic values into the future using a one-year iteration process beginning in 1971. We have used the economic model to obtain economic projections for the Mid-Atlantic coastal counties from New York to Virginia for the years 1975, 1980, 1985, and 1990. These economic values obtained reflect a base case where no Baltimore Canyon activity occurs. Utilizing data from industry and USGS sources investment, employment, and output figures were hypothesized. Based on the assumptions discussed in this chapter, these figures were then allocated by county and year and used as input into the economic model to reflect the case where Baltimore Canyon activity does occur. The economic model was rerun to reflect this hypothesized scenario and economic projections for the same coastal counties and years were obtained. The impact of the potential sale was then estimated by calculating the differences between the with and without Baltimore Canyon activity cases for the years examined.

For each scenario (with and without Baltimore Canyon activity) data was obtained for the following levels of aggregation:

1. County (including independent cities)
2. State coastal regions
3. Mid-Atlantic coastal region as a whole
4. United States as a whole

The county, State, and regional aggregations included only the following counties and independent cities:

<u>Deleware</u>	<u>New Jersey (continued)</u>	<u>Pennsylvania</u>
1. Kent	27. Essex	55. Bucks
2. Newcastle	28. Gloucester	56. Delaware
3. Sussex	29. Hudson	57. Philadelphia
	30. Mercer	
<u>Maryland</u>	31. Middlesex	<u>Virginia</u>
4. Anne Arundel	32. Monmouth	58. Accomack
5. Baltimore	33. Ocean	59. Charles City
6. Calvert	34. Passaic	60. Gloucester
7. Caroline	35. Salem	61. Isle of Wight
8. Cecil	36. Somerset	62. James City
9. Charles	37. Union	63. Lancaster
10. Dorchester		64. Mathews
11. Harford	<u>New York</u>	65. Middlesex
12. Kent	38. Albany	66. Nansemond
13. Prince Georges	39. Bronx	67. Northampton
14. Queen Annes	40. Columbia	68. Northumberland
15. St. Marys	41. Dutchess	69. Prince George
16. Somerset	42. Greene	70. Surry
17. Talbot	43. Kings	71. Westmoreland
18. Wicomico	44. Nassau	72. York
19. Worcester	45. New York	
	46. Orange	<u>Independent Cities</u>
<u>Independent City</u>	47. Putnam	73. Chesapeake City
20. Baltimore City	48. Queens	74. Hampton
	49. Rensselaer	75. Hopewell
<u>New Jersey</u>	50. Richmond	76. Newport News
21. Atlantic	51. Rockland	77. Norfolk
22. Bergen	52. Suffolk	78. Portsmouth
23. Burlington	53. Ulster	79. Suffolk
24. Camden	54. Westchester	80. Virginia Beach
25. Cape May		81. Williamsburg
26. Cumberland		

The following are the formats used in printing the tables of output:

Industry Groupings	1975 <u>Output</u>	1980 <u>Output</u>	1985 <u>Output</u>	1990 <u>Output</u>	1975 Total <u>Supply</u>	1980 Total <u>Supply</u>	1985 Total <u>Supply</u>	1990 Total <u>Supply</u>
A								
B								
C								
D								
E								
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G								
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I								
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K								
L								
M								
N								
O								
P								
Q								
R								
S								
T								
U								
V								
W								
Total								

<u>Industry</u> <u>Groupings</u>	<u>1975</u> <u>Earnings</u>	<u>1980</u> <u>Earnings</u>	<u>1985</u> <u>Earnings</u>	<u>1990</u> <u>Earnings</u>	<u>1975</u> <u>Number</u> <u>Of Jobs</u>	<u>1980</u> <u>Number</u> <u>Of Jobs</u>	<u>1985</u> <u>Number</u> <u>Of Jobs</u>	<u>1990</u> <u>Number</u> <u>Of Jobs</u>
A								
B								
C								
D								
E								
F								
G								
H								
I								
J								
K								
L								
M								
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O								
P								
Q								
R								
S								
T								
U								
V								
W								
Extra Labor Sectors								
X								
Y								
Z								
ZZ								

Total

<u>Industry</u> <u>Groupings</u>	1975 Total <u>Demand</u>	1980 Total <u>Demand</u>	1985 Total <u>Demand</u>	1990 Total <u>Demand</u>	1975 Value <u>Added</u>	1980 Value <u>Added</u>	1985 Value <u>Added</u>	1990 Value <u>Added</u>
A								
B								
C								
D								
E								
F								
G								
H								
I								
J								
K								
L								
M								
N								
O								
P								
Q								
R								
S								
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U								
V								
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Total

Industry Groupings	1975 Foreign <u>Exports</u>	1980 Foreign <u>Exports</u>	1985 Foreign <u>Exports</u>	1990 Foreign <u>Exports</u>	1975 Foreign Competitive <u>Imports</u>	1980 Foreign Competitive <u>Imports</u>	1985 Foreign Competitive <u>Imports</u>	1990 Foreign Competitive <u>Imports</u>
A								
B								
C								
D								
E								
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G								
H								
I								
J								
K								
L								
M								
N								
O								
P								
Q								
R								
S								
T								
U								
V								
W								
Total								

Industry Groupings	1975 Personal Consumption <u>Expenditures</u>	1980 Personal Consumption <u>Expenditures</u>	1985 Personal Consumption <u>Expenditures</u>	1990 Personal Consumption <u>Expenditures</u>
A				
B				
C				
D				
E				
F				
G				
H				
I				
J				
K				
L				
M				
N				
O				
P				
Q				
R				
S				
T				
U				
V				
W				
Total				

Equipment Purchasing

Equipment Purchasing Sectors	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	1975 To 1990 <u>Total</u>
A																	
B																	
C																	
D																	
E																	
F																	
G																	
H																	
I																	
J																	
K																	
L																	
M																	
N																	
O																	
P																	
Q																	
R																	
Total																	

Construction

Construction Sectors

1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 T

A
B
C
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E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T

Total

			<u>1975</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>
	1975					
	To					
	1990					
<u>1989</u>	<u>1990</u>	<u>Total</u>				
	Civilian Labor Force					
	Net Commuters					
	Civilian Persons Employed					
	Civilian Unemployment					
	Civilian Unemployment Rate					
	Population Density					
	Multi-Job Holders					
	Net Population Migration					
	Population Associated With Labor Force Surplus					
	Population					
	Personal Income					
	Earnings					
	Property Income					
	Social Insurance Payments					
	Transfer Payments					
	Agricultural Value Of Land Per Acre					
	Federal Government Expenditure (Excl Const & Emp Comp)					
	State & Local Government Expenditure (Excl Const & Emp Comp)					
	Federal Government Purchases (Excl Const)					
	State & Local Government Purchases (Excl Const)					
	Personal Consumption Expenditures					
	Private Investment					
	Gross Regional Product					
	Per Capita Income					
	Total Supply					
	Total Demand					
	Domestic Output					
	Competing Imports					
	Noncompetitive Industry Imports					
	Noncompetitive Consumer Imports					
	Gross Foreign Exports					
	Value Added					
	Equipment Purchases					
	Construction					
	Federal Defense Expenditures					

The following data groupings were used for those tables involving sector breakdowns. They include industry groupings, extra labor sectors, extra import sectors, equipment purchasing sectors, construction groupings, government sectors, and population age sectors. Numbers in parenthesis refer to groupings made by Professor Harris as presented in

Harris, Curtis C., Jr. The Urban Economies, 1985
Lexington, Massachusetts: D.C. Heath and Company, 1973.

Industry Groupings

- A Livestock (1), Crops (2), Agricultural Services (4), Meat Packing (14), Dairy Products (15), Canned and Frozen Foods (16), Grain Mill Products (17), Bakery Products (18), Sugar (19), Candy (20), Beverages (21), Miscellaneous Food Products (22), Tobacco (23)
- B Forestry and Fishery Products (3)
- C Iron Ore Mining (5), Non Ferrous Ore Mining (6), Coal Mining (7), Mineral Mining (9), Chemical Mining (10)
- D Petroleum Mining (8)
- E Fabrics and Yarn (24), Rugs, Tire Cord, Miscellaneous Textiles (25), Apparel (26), Household Textiles and Upholstery (27)
- F Lumber and Production Excluding Containers (28), Wooden Containers (29), Household Furniture (30), Office Furniture (31), Paper and Production Excluding Containers (32), Paper Containers (33)
- G Basic Chemicals (35), Plastics and Synthetics (36), Drugs, Cleaning and Toilet Stems (37), Paint and Allied Products (38), Rubber and Plastic Products (40)
- H Petroleum Refining (39)
- I Leather Tanning (41), Shoes and Other Leather Products (42), Glass and Glass Products (43), Stone and Clay Products (44)
- J Iron and Steel (45)
- K Copper (46), Aluminum (47), Other Non Ferrous Metals (48), Metal Containers (49), Heating, Plumbing, Structural Metal (50), Stampings, Screw Machine Products (51), Hardware, Plating, Wire Products (52)
- L Ordnance (13), Engines and Turbines (53), Farm Machinery and Equipment (54), Construction and Mining Machines (55), Material Handling Equipment (56), Metal Working Machinery and Equipment (57), Special Industrial Machinery (58), General Industrial Machinery (59), Machine Shops and Miscellaneous Machinery (60), Office and Computing Machines (61), Service Industry Machines (62), Electric Apparatus and Motors (63), Household Appliances (64), Electric Light and Wiring Equipment (65), Communication Equipment (66), Electronic Components (67), Batteries and Engine Electrical Equipment (68), Motor Vehicles (69), Aircraft and Parts (70), Ships, Trains, Trailers, Cycles (71), Instruments and Clocks (72), Optical and Photographic Equipment (73), Miscellaneous Manufactured Products (74)

Industry Groupings (Continued)

M Transportation (75)

N Printing and Publishing (34), Communication (76), Radio, Television,
Broadcasting (77)

O Electric Utility (78), Gas Utility (79)

P Water Utility (80)

Q Wholesale Trade (81)

R Finance and Insurance (82), Real Estate and Rental (83)

S Motels, Personal and Repair Services (84), Amusements and Recreation (87)

T Business Services (85), Lumber, Housewares, Farm Equipment Stores (89),
General Merchandise Stores (90), Food Stores (91), Apparel
Accessory Stores (94), Furniture Stores (95), Eating, Drinking
Places (96), Drug and Proprietary Stores (97), Other Retail
Stores (98), Non-Store Retailers (99)

U Medical and Educational Institutions (88)

V Automobile Repair Services (86), Automotive Dealers (92), Gasoline
Service Stations (93)

W New Construction (11), Maintenance Construction (12)

Extra Labor Sectors

X	Federal Civilian Government (100)
Y	State and Local Government (101)
Z	Domestic Services (102)
22	Armed Forces (103)

Extra Import Sectors

Noncompetitive Industry Imports (100)
Noncompetitive Consumer Imports (101)

Equipment Purchasing Sectors

- A Farm (1), Meat Products (6), Tobacco (7), Dairy Products (62), Canned and Frozen Foods (63), Grain Mill Products (64), Bakery Products (65), Sugar (66), Confectionery (67), Beverages (68), Miscellaneous Foods (69)
- B Mining (2)
- C Oil and Gas Wells (3)
- D Construction (4)
- E Fabrics and Yarn (8), Rugs, Tire Cord (9), Apparel (10), Household Textiles and Upholstery (11)
- F Lumber and Productions Excluding Containers (12), Wooden Containers (13), Household Furniture (14), Office Furniture (15), Paper, Excluding Containers (16), Paper Containers (17)
- G Basic Chemicals (19), Drugs, Cleaning, and Toilet Items (21), Paint (22), Plastics and Synthetics (20), Rubber and Plastic (24)
- H Petroleum Refining (23)
- I Leather Tanning (25), Shoes and Other Leather Products (26), Glass and Products (27), Stone and Clay Products (28)
- J Iron and Steel (29)
- K Non Ferrous Metals (30), Metal Containers (31), Heating, Plumbing, Structural Metal (32), Stampings, Screw Machine Products (33), Hardware, Plating, Wire Products, and Valves (34)
- L Ordnance (5), Engines and Turbines (35), Farm Machinery and Equipment (36), Construction and Material Handling Equipment (37), Metal Working Machinery (38), Special Industrial Machinery (39), General Industrial Machinery (40), Machine Shops and Miscellaneous (41), Office and Computing Machines (42), Service Industry Machinery (43), Electric Apparatus and Motors (44), Household Appliances (45), Electric Lighting and Wirings (46), Communication Equipment (47), Electronic Components (48), Batteries, X-Ray and Engine Electrical Equipment (49), Motor Vehicles (50), Aircraft and Parts (51), Ships, Trains, and Cycles (52), Instruments (53), Optical and Photographic Equipment (54), Miscellaneous Manufacturing (55)

Equipment Purchasing Sectors (Continued)

M	Transportation (56)
N	Printing and Publishing (18), Communication (57)
O	Utility (58)
P	Trade (59)
Q	Finance and Insurance (60)
R	Service (61)

Construction

- A Residential (1), Additions and Alterations to Residences (2),
Nonhousekeeping Residential Construction (3)
- B Offices (5), Stores, Restaurants and Garages (6), Miscellaneous
Nonresidential Building " ", All Other Private Construction (17)
- C Industrial (4)
- D Religious (7)
- E Educational (8)
- F Hospital and Institutional (9)
- G Farm Construction (11)
- H Oil and Gas Well Drilling and Exploration (12)
- I Railroad (13)
- J Highway (18)
- K Telephone (14)
- L Electric Utility (15)
- M Gas and Petroleum Pipelines (16)
- N Sewer Systems (21), Water Systems (22)
- O Conservation (20)
- P Public Residential (23)
- Q Public Industrial Construction (24)
- R Public Educational (25)
- S Public Hospital (26)
- T Military (19), Other Public Structures (27), Miscellaneous Public (28)

Government Sectors

- A National Aeronautics and Space Administration (1). Federal Government Not Listed Elsewhere (2), Federal Government Enterprises (3), Expenditures From Or Sales To The Livestock Sector (4), Expenditures From Or Sales To The Crop Sector (5), Expenditures From Or Sales To The Forestry and Fisheries Sector (6), Expenditures From Or Sales To The Lumber Sector (7)
- B State and Local Government

Population Age Sectors

- A Ages 14 And Under (1), Ages 15--34 (2), Ages 35--64 (3), Ages 65 And Over (4)

Both scenarios (with and without Baltimore Canyon activity) are based on wellhead prices of \$11 per barrel for oil and \$1 per thousand cubic feet for gas. In order to derive the total persons employed, it was assumed that the civilian unemployment rate will rise to 9% in 1975, fall to 5% in 1980, rise to 6% in 1985, after which it will return to 5% in 1990. The with Baltimore Canyon activity scenario is consistent with the following set of assumptions:

1. Recoverable resources of oil for the entire Baltimore Canyon are assumed to be from 3 to 5 billion barrels. Recoverable resources of gas for the entire Baltimore Canyon are assumed to be from 15 to 25 trillion cubic feet.

In formulating a production schedule for oil and gas, USGS used the midpoint resource estimates of 4 billion barrels of oil and 20 trillion cubic feet of gas for the entire Baltimore Canyon. It was assumed that the area offered for sale would contain 80% of these levels of recoverable resources. It was further assumed that the area actually leased would contain 80% of these levels. The level of recoverable resources of oil was therefore assumed to be 2.6 billion barrels of oil and 12.8 trillion cubic feet of gas. These estimates were made by USGS before the tract selection process for Baltimore Canyon Sale Number 40 was completed. They were derived using a modified Hendricks method. An explanation of the Hendricks method can be found in USGS Circular 522.

USGS has since revised these estimates downward to include more complete information obtained from the tract selection process. A range was provided of .4 to 1.4 billion barrels of oil and 2.6 to 9.4 trillion cubic feet of gas. These estimates were obtained by using actual geophysical data and comparing the estimated acreage within closure to success ratios and historical field data in already producing areas. For purposes of our study, the high initial pre-tract selection estimates were used so as to include a high impact case within the study. The reader should be reminded, however, that recoverable resource estimates in totally untested frontier areas are founded on very limited scientific or technical data and accordingly have a high degree of uncertainty.

2. Production of oil and gas is assumed to commence in 1981, peak to a level of nearly 740,000 barrels of oil per day and 4,400,000 thousand cubic feet of gas per day in 1989 and 1990, and end in the year 2000.

This assumption is consistent with the recoverable resource ranges used in this study. It represents a reasonable production scenario hypothesized by USGS for purposes of this study and is consistent with the recoverable resource estimates of 4 billion barrels of oil and 20 trillion cubic feet of gas. Table 2 provides the hypothesized production schedule of oil and gas used in the study.

Table 2

Hypothesized Annual Production Schedule

	<u>Production</u>	
	<u>Oil</u>	<u>Gas</u>
	<u>mm bbls</u>	<u>mm mcf</u>
1981	25	20
1982	50	40
1983	80	140
1984	110	600
1985	140	800
1986	170	1,000
1987	220	1,200
1988	270	1,400
1989	270	1,600
1990	270	1,600
1991	250	1,200
1992	220	800
1993	170	400
1994	110	400
1995	90	400
1996	60	320
1997	40	280
1998	25	240
1999	15	200
2000	<u>15</u>	<u>160</u>
	2,600	12,800

3. All prices and costs are given in 1974 dollars and were converted to 1972 dollars before being used as input to the economic model. The output of the economic model is in terms of 1972 dollars.

This is a standard way of holding real prices and costs constant over time for analytical purposes. It is done so that the price or cost of a particular good or service relative to the cost of other goods and services in the economy remains constant over time. The "real" value of a particular good or service is assumed not to be eroded by a rise in the cost of living.

4. The price of oil is assumed to be \$11 per barrel at the wellhead. The price of gas is \$1 per thousand cubic feet at the wellhead.
assumed to be

These prices were used in the Project Independence Report completed in November 1974. They represent a scenario that would promote accelerated energy supply development and energy consumption conservation. It is assumed for purposes of this study that these high prices will be maintained over time. Research and development is assumed to be undertaken so as to develop alternative energy supplies in the long run.

The leasing of the Baltimore Canyon could be seen as an intermediate solution to the energy problem in that it could buy more time until these alternative sources of energy are developed in the long run. A short run solution to the energy problem is reflected by the high prices assumed and their dampening effect on consumption. At higher prices less oil and gas will be demanded, other factors remaining constant.

On the supply side, output of oil and gas results from three types of activities. Exploration is undertaken in order to discover oil and gas resources. Development occurs in order to create reserves of oil and gas. Production of oil and gas results in the extraction of reserves. Reserves are defined as the amount of oil and gas that can be produced given the level of prices and technology to be used. A producer will not extract a unit of oil or gas if the cost of doing so is greater than the amount of revenue that can be gotten for it. The amount of oil and gas produced is therefore dependent on price and cost. Less oil and gas will be produced on tracts that require higher unit costs of production. Lower oil and gas price levels will also decrease the amount of oil and gas that is produced from a given tract. The hypothesized production schedule is consistent with the oil and gas prices assumed.

5. A competitive cash bonus leasing system is assumed. A royalty rate of $1/6$ of the wellhead price is assumed with Federal control of revenue.

This is the present system used most often by BLM. Some uncertainty exists in this area and until some alternative is decided upon this assumption will be used. The economic model does not explicitly determine government revenue but does quantify government expenditure. Table 3 indicates the level of royalty payments by year assumed and used as input into the economic model.

Table 3
Royalty Payments
(\$ Million)

	<u>Oil</u>	<u>Gas</u>
1981	45.9	3.3
1982	91.9	6.7
1983	147.0	23.4
1984	202.1	100.2
1985	257.2	133.6
1986	312.3	167.0
1987	404.1	200.4
1988	496.0	233.8
1989	496.0	267.2
1990	496.0	267.2

6. The range of water depths on proposed leasing tracts varies from a minimum of 36.4 meters (118 feet) to a maximum of 200 meters (660 feet). The water depth on the majority of the tracts is between 51 meters (168 feet) and 100 meters (330 feet).

The proposed Federal action under consideration is the leasing of 154 tracts on the Mid-Atlantic Outer Continental Shelf, in an area known as the Baltimore Canyon Trough. These tracts comprise an area of 876,750 acres. They are being proposed to be leased for the exploration, development, and production of potential oil and gas resources. The sale under consideration includes tracts offshore New Jersey and Delaware. The tracts in this proposed sale range from 36.4 meters to 172.9 meters (118 to 571 feet) in water depth and from 54 to 108.5 miles from shore. No tracts include areas in water depths greater than 200 meters. These water depths were used as one of the factors in estimating drilling costs. The depths were obtained by using Coast and Geodetic Survey Charts

0807N-52, 0807N-53, 0807N-54, 0807N-55, and 0807N-56. Each proposed leasing tract was approximately located on these charts and the average depth determined.

7. Development wells are assumed to drill to an average depth of 457 meters (15,000 feet).

This is based on USGS estimates. The drilling depth was considered in estimating the cost of development well drilling.

8. An exploratory rig is assumed to drill 5 wells per year. A development rig is assumed to drill 6 to 8 wells per year. 1-2 rigs are assumed to operate on each platform with an average of 20 development wells per platform producing 850 barrels of oil per well per day. At peak production, 44 platforms are assumed to be in operation, producing 17,000 barrels of oil per day per platform.

We have assumed that 5 exploratory wells will be drilled by one exploratory rig in one year. Others have estimated only 4 wells per rig. Both these estimates may be optimistic in light of the anticipated depth of wells. For development rigs we have assumed that 6-8 wells will be drilled by each rig per year. This estimate falls within the range which most others have used. Since development rigs exhibit less mobility than exploratory rigs, they should be able to drill more wells per year than an exploratory rig.

We have changed the estimate of less than 400 barrels/well/day production provided by USGS, as explained further on. In doing this we also changed both the total wells drilled and total number of platforms. However, we have taken the wells drilled schedule provided by USGS and applied it to our new wells drilled total, following approximately the same rate of drilling estimated by USGS to arrive at wells drilled per year.

As stated in the USGS document, Sediments, Structural Framework, Petroleum Potential, Environmental Conditions, and Operational Considerations of the Mid-Atlantic Area, USGS has indicated that

as many as 2000 development wells and 100 platforms could be needed for a first Baltimore Canyon sale, based on an estimated 2.6 billion barrels of recoverable oil. This would mean a daily production per well of under 400 barrels.

We have analyzed development scenarios developed by others and discussed these differences with USGS. They indicated that the average daily well production in the Gulf of Mexico is between 200 and 300 barrels and for this reason they have used a conservative estimate. Others' estimates have considered North Sea production in coming up with their estimates. USGS indicated that production per platform can be as high as 150,000 barrels/day in the Middle East, so that there is a wide range of well and platform yields, depending upon the structures involved. However, it is impossible to know the rate that structures in the Mid-Atlantic will yield. For this reason, USGS indicated that we could use a higher daily well production figure without being unreasonable.

We are utilizing a well/platform ratio of 20 as provided by USGS. This estimate falls within the 15 to 36 well/platform ratio used by others. We have therefore assumed that 44 platforms would be in operation, producing 17,000 barrels per day per platform.

9. Unitization of reservoirs is assumed to take place.

This would allow efficient production of oil and gas from reservoirs that exist in several tracts.

10. Labor, capital, and materials required for a potential Baltimore Canyon development-production plan are assumed to be available and not to pose a constraint on any such plan.

The oil and gas industries have a multiregional perspective and may be expected to compare the costs and benefits of operating in different regions (including the Mid-Atlantic coastal region) and cause the movement of factors of production to the more profitable areas. Implicit in this study is the assumption that the costs, prices, level, and distribution of recoverable resources hypothesized represent a favorable level of profitability and provide the incentive for the oil and gas industries to decide to invest in the Mid-Atlantic coastal region. It is hypothesized that the economic incentive exists to cause the movement of labor, capital, and materials to the Mid-Atlantic coastal region in sufficient amounts to support Baltimore Canyon activity. These factors of production may be drawn from alternative uses and preclude activity in other areas and activities showing a lower priority.

There is a possibility that equipment supply difficulties in industry could stem from potential steel shortages. Much of the technical equipment to be used would be fashioned from steel, specifically tubular steel. Tubular goods should stay tight over the years and become more costly.¹ Equipment and rig shortages, however, reached their peak in late 1974 and early 1975 and have eased sharply since.² A U.S. Department of Commerce report indicates that the number of rigs available for use in 1976 is

¹ See Oil and Gas Journal, March 17, 1975, p.62.

² See Oil and Gas Journal, August 4, 1975, p.29-32.

expected to rise to 245 units. This figure compares to the National Petroleum Council's rig availability estimate for 1976 of 178 units. In 1974, 157 units were capable of drilling 5,000 feet or more. There is a trend toward bigger rigs being built capable of drilling deeper wells.¹ In April of 1975 the Offshore Rig Data Services indicated that international rig demand has shifted from a sellers to a buyers market and for the first time in years, rigs are, and will be, delivered from yards without a firm drilling commitment.²

With regard to manpower needs, there is the possibility that skilled labor needed to support Baltimore Canyon activity, including petroleum engineers and highly skilled rig and platform workers, could be in short supply. On-the-job training of other types of engineers and skilled workers could lessen the potential for manpower shortages. Many skills found in other industries existing within the Mid-Atlantic coastal region could be easily adapted to the offshore petroleum industry. Another source of labor supply could be those who are presently unemployed. We therefore conclude that while spot shortages of equipment and skilled manpower may appear, any such shortages

¹ See Oil and Gas Journal, April 21, 1975, p.61.

² See Offshore Rig Data Services, Offshore Rig Newsletter, April, 1975, p.3-4.

are not expected to pose a noticeable constraint to a development-production plan similar to the one hypothesized for purposes of this study should one be formulated.

11. The construction of a given facility needed to support offshore oil and gas development is assumed to occur within a year's time unless otherwise indicated.

A one year or less construction time is assumed so as to be compatible with the one year iterative nature of the model. An exception to this assumption is the construction of 1 billion cubic feet of gas processing capacity on a given site. It is assumed that 500 million cubic feet of capacity is built in one year and the additional 500 million cubic feet of capacity is added to the site as a need for greater capacity becomes evident. Another exception to this assumption stems from the fact that it usually takes up to 3 years from the time an order is placed to have a platform installed. A down payment is usually made in the first year.

12. No deep water ports are assumed.

This assumption was made to allow the effects of offshore activity to be clearly analyzed, separating them from any effects that a deep water port may have. A deep water port, if large enough, could reduce somewhat the cost of imported crude, hence the value of crude landed from the OCS.

13. Existing harbor facilities are assumed to be used to support the initial years of exploration at Philadelphia County, Pennsylvania, Kings County, New York, and Union County, New Jersey.

This assumption seems logical in light of the availability of port facilities in these counties and the need to invest capital only after it is determined that the amount of recoverable oil and gas is sufficient to warrant the heavy capital expenditures needed to support OCS production and development. Operators are assumed to be in a strong discovery situation with the development of reserves being expedited.

14. Onland operations bases able to support exploratory and development operations and the production of 200,000 barrels of oil per day are assumed to be built as follows:

- a. 1 in Atlantic County, New Jersey in 1979
- b. 1 in Kings County, New York in 1983
- c. 1 in Cape May County, New Jersey in 1985
- c. 1 in Monmouth County, New Jersey in 1988

The selection of areas to be described was not developed in concert with petroleum industry representatives or any individual counties or States. It was, however, a consolidation and weighing of information supplied by all such sources. In no way should it be construed as a designation of sites which will ultimately be used for operation base purposes. It is merely an evolution of reasonable case assumptions based on the best available data. The ultimate authority for siting lies with State and local governmental entities.

The approach used included the following:

1. National Ocean Survey Maps (NOAA) of near shore areas adjacent to the proposed lease areas were reviewed to identify suitable "Port" areas.
2. County land use and development plans were reviewed to identify industrially zoned areas suitable for development.
3. Some county planners were contacted to verify the zoning classification and to quantify the amount of land which is vacant.
4. USGS Topographical Maps and highway maps were used to identify major highway and rail access.
5. Those sites which still "Qualified" for consideration were mapped on the composite tract map and 100 and 125 mile radius arcs were drawn from them.
6. Calculations were then made to determine the percentage of the proposed Baltimore Canyon lease area which could be effectively serviced (by boat and helicopter) from each.
7. Final areas evolved from a balancing of the need to maximize the servicing area with the desirability of satisfying other requirements and considerations.

Requirements and/or desirable factors included the following:

1. 50 acres of land
2. Industrial zoning
3. Inland water docksite location with access to the Atlantic Ocean
4. 15 feet water depth, channel and docksite
5. Access by major highway
6. Rail access reasonably close
7. Avoid initial and/or maintenance dredging
8. Avoid impacting wetlands by filling or other means
9. Minimize the total number of operations bases - i.e. spread geographical distribution so as to accommodate a base's range of service approximately 125 miles

The Offshore Operators Committee supplied information regarding requirements and/or desirable factors that would be taken into consideration in locating possible operations bases. Hopefully, several assumptions which were made express State and local, as well as Federal, concerns in the siting of onshore facilities.

15. Gas and oil is assumed to be carried in separate pipelines with separation of oil and gas in associated wells occurring at the wellhead. All of the gas produced is assumed to be processed.

Market conditions are assumed to provide economic incentives for gas producers to process all gas that is produced. Gas is assumed to be produced from associated and non-associated wells. Separation can either occur at the wellhead or onshore. For our purposes the former was assumed.

16. Large pipelines within four pipeline corridors are assumed to stem from four gathering points.

This assumption reflects a case in which oil and gas resources are widely distributed and are in sufficient quantities in each area to be commercially recoverable. The rate and distribution of OCS oil and gas production determine the number and location of gathering points that would be used as foci for the transportation of oil and gas to shore. Small gathering lines are assumed to be used to transport oil and gas to these centralized points. Large pipelines would then carry the oil and gas to shore within pipeline corridors. The nature of a particular corridor would depend on

the rate and distribution of OCS oil and gas production and require planning and coordination among Federal, State, local, and industry officials. Future pipeline corridor management planning studies would delineate specific pipeline corridors. Explicit in these future studies would be the information of an actual development-production plan (both onshore and offshore). The establishment of any pipeline corridor would require the formulation of a development-production plan by industry and its thorough review by Federal, State, and local officials.

17. Pipelines are assumed to be built as follows:

- a. 225 miles of pipeline built from an OCS gathering point to the Atlantic County, New Jersey terminal, Atlantic County, New Jersey gas processing area and existing gas distribution lines, and a port of Philadelphia/Delaware area refinery (Philadelphia County, Pennsylvania) in 1980
- b. 185 miles of pipeline built from an OCS gathering point to the Monmouth County, New Jersey terminal, Monmouth County, New Jersey gas processing area and existing gas distribution lines, and a port of New York/New Jersey area refinery (Middlesex County, New Jersey) in 1981
- c. 200 miles of pipeline built from an OCS gathering point to the Cape May County, New Jersey terminal, Cape May County, New Jersey gas processing area and existing gas distribution lines, and a port of Philadelphia/Delaware area refinery (Gloucester County, New Jersey) in 1982
- d. 200 miles of pipeline built from an OCS gathering point to the Ocean County, New Jersey terminal, Ocean County, New Jersey gas processing area and existing gas distribution lines, and a port of New York/New Jersey area refinery (Union County, New Jersey) in 1983

Pipeline mileage was calculated by locating actual gathering points that were centrally located in four different areas of the potential

leasing area and measuring the distance of hypothetical oil pipeline routes through terminal areas to refinery areas receiving the crude and the distance of hypothetical gas pipeline routes through gas processing areas to existing distribution lines allowing some extra mileage under the assumption that the most direct route was not always feasible due to environmental considerations. Onland pipeline mileage was estimated for each county.

18. Pipeline land terminals each with a capacity of 200,000 barrels of oil per day are assumed to be built as follows:
 - a. 1 in Atlantic County, New Jersey in 1980
 - b. 1 in Monmouth County, New Jersey in 1981
 - c. 1 in Cape May County, New Jersey in 1982
 - d. 1 in Ocean County, New Jersey in 1983.

Wells are assumed to be capped until pipelines are built.

Productive levels of each field are assumed to be established during the exploratory phase with pipeline needs foreseen at this time. Large diameter pipelines (32 inches) are assumed to be laid and onland terminal facilities constructed just prior to production and during the first few years of production so that they would all be operational as production increased to peak levels.

Industry, in deciding where to locate a pipeline land terminal, would consider sites at which greater profits could be achieved than would be possible if it were located elsewhere. It is therefore

likely that coastal areas adjacent to the Baltimore Canyon would be preferred by industry. If localities are receptive to these new facilities, they may still be expected to place conditions upon industry entering the area. To the degree that these conditions place costs upon firms that favor a particular location, these firms may or may not find it profitable to locate in a particular locality.

In deciding whether a particular site is desirable, a firm will consider the transportation costs of its inputs and outputs. The firm will seek to minimize the transportation costs of shipping goods and services to where they are needed and the transportation costs of the materials needed to provide these goods and services. Cost of labor is also a consideration. Wide differences in the cost of labor can be found in the Mid-Atlantic coastal region. No wage rate has been established within the area for many of the economic activities needed. Firms will seek to have wage rates high enough to attract persons having the needed skills but in areas where wage costs would be minimized. It is likely that areas with lower labor costs will provide an incentive for firms to locate in a particular locality. The presence of unemployment in an area might also tend to lower the amount of wages that an entering firm would need to pay.

In order to gain a more favorable location, however, a firm may be required to pay high acquisition costs to obtain a given parcel of land thereby eliminating any economic advantage to be gained by that site. Other things being equal, those areas with lower acquisition costs are more likely to be favored by a firm.

In selecting areas in which to locate pipeline land terminals for purposes of this study, the New Jersey coastal region seemed favorable with regard to the factors just discussed. In making an actual siting decision industry would weigh economic considerations against the zoning laws and physical characteristics that would accompany a particular parcel of land.

19. Production of oil is assumed to replace imports. Imports of oil are assumed to be decreased by the amount of OCS oil production.

The assumption is consistent with a policy of decreasing United States dependence on foreign sources of energy. This assumption will decrease the level of economic activity in the counties which are now used as a port of entry for the oil to be replaced. It will increase the level of economic activity in the counties in which terminals are built to handle the new OCS oil.

Historically imported oil has been used to fill the gap between domestically produced oil and the total demand for oil. To the extent that imported oil is used to meet future demand, any OCS oil that might be produced in the Baltimore Canyon could be expected to replace a share of the imported oil. The need for any new refinery capacity in the area would be in response to consumer demand rather than to any new crude oil supplies which may flow from the Baltimore Canyon. It is felt that a new refinery would not be built as a result of production of crude oil from the leasing area. Any new refinery that might be built in the area would instead stem mainly from demand conditions. It would be possible however for Baltimore Canyon oil to be processed at a newly built refinery.

20. Oil refinery capacity in the port of New York/New Jersey area is assumed to be 453,000 barrels per day. One-half of Baltimore Canyon OCS crude oil production is assumed to be refined by existing capacity in the port of New York/New Jersey area. Nearly 370,000 barrels per day at peak production is assumed to reach port of New York/New Jersey area refineries.

Oil refinery capacity in the port of Philadelphia/Delaware area is assumed to be 994,500 barrels per day. One-half of OCS crude oil production is assumed to be refined by existing capacity in the port of Philadelphia/Delaware area. Nearly 370,000 barrels per day at peak production is assumed to reach port of Philadelphia/Delaware area refineries.

Production of oil from the proposed Baltimore Canyon sale is assumed to flow to existing refineries located within the area, imported oil being replaced by OCS production, and improvement and modernization investment being taken as needed. It is felt that new refineries will not be built as a result of production from the leasing area. Decisions to build new refineries are highly complex. They include consideration of demand, market location, supply of crude, availability and cost of capital, time for amortization, cost of crude, price of product, site availability, State and local receptivity to refinery development, and air and water quality standards. These factors are affected by National concerns.

Alternatives to the option of building a new refinery include replacement of foreign crude with OCS oil, greater utilization of existing refinery capacity, and the expansion of existing refinery capacity. These alternatives seem more likely to be taken in the Mid-Atlantic coastal region as suggested by the recent closing of the Amerada Hess refinery, the cancellation of expansion plans at the Mobil refinery, and given the great uncertainty surrounding the decision to invest in new refineries.

It is not known whether the production of OCS oil in the Baltimore Canyon would combine with other factors to affect the decision to invest in a new refinery within the Mid-Atlantic coastal region and, if it would, what level of oil production would be needed to stimulate

the construction of a new refinery. A study is planned by BLM that would allow the economic relationship of OCS oil production and refinery investment to be analyzed. It is felt that production of 740,000 barrels of oil per day at peak production in the Baltimore Canyon could be adequately handled by the 1976 capacity in the region of 1.5 million barrels of oil per day and would not stimulate the construction of a new refinery in the region.

Arthur D. Little, Incorporated in Potential Onshore Effects of Deepwater Oil Terminal-Related Industrial Development, has estimated that existing refinery capacity in the Mid-Atlantic could be expanded to 2.3 million barrels per day on site, that is, with no new refineries. It is more likely that any Baltimore Canyon oil production stemming from the potential sale would replace imported crude. It is acknowledged that the quality of crude oil to be found in the Baltimore Canyon may preclude the substitution of all foreign sources of crude reaching the Mid-Atlantic coastal region's refineries. It is unlikely, for example, that asphaltic crude imported from Venezuela will be replaced by a nonasphaltic crude that may be found in the Baltimore Canyon OCS. The fact that the Baltimore Canyon OCS crude oil may be either a sweet or sour crude appears to be no problem with regard to the existing refinery capacity in the area being able to process the crude oil.

Refinery capacity figures reflect estimates of early 1976 capacity, including the expected 20,000 barrel per day capacity expansion of the Bayway refinery in 1976. Additional refinery capacity in other port areas within the region include 26,500 barrels per day in Maryland and 53,000 barrels per day in Virginia. New refineries have been proposed for the Baltimore, Maryland and Hampton Roads, Virginia areas. Refinery capacity has not been affected by the recent oil-tanker ramming at Marcus Hook, Pennsylvania and the two refinery fires in the Philadelphia, Pennsylvania area.

21. Gas processing capacity is assumed to be built as follows:
- a. 500 million cubic feet per day capacity in Atlantic County, New Jersey in 1980 and an additional 500 million cubic feet per day capacity in 1985 on the same site
 - b. 500 million cubic feet per day capacity in Monmouth County, New Jersey in 1981 and an additional 500 million cubic feet per day capacity in 1985 on the same site
 - c. 500 million cubic feet per day capacity in Cape May County, New Jersey in 1982 and an additional 500 million cubic feet per day capacity in 1986 on the same site
 - d. 500 million cubic feet per day capacity in Ocean County, New Jersey in 1983 and an additional 500 million cubic feet per day capacity in 1986 on the same site

Gas processing as used within the context of this study refers to the stripping of the economically valuable propanes and butanes from natural gas before it enters the distribution system. This process should not be confused with the process of separating oil, gas, and water once it leaves the wellhead.

Unlike the relationship between refinery capacity and Outer Continental Shelf development, there is, unmistakably, a direct relationship between offshore gas production and the onshore development of gas processing plants. Liquefied natural gas which has been imported from other countries has already been dehydrated, desulfurized, and stripped of the propanes and butanes before being transported by tankers. Natural gas from other regions of the United States which is utilized in the Mid-Atlantic coastal region has been processed in the region of origin prior to being transported via pipeline to this area. Based upon these factors of gas processing, there is presently no gas processing capacity in the Mid-Atlantic coastal region.

If proven reserves of natural gas can be developed in the Baltimore Canyon, it would result in "grass root" processing growth onshore. The absence of propanes and butanes in natural gas discovered offshore would preclude the necessity of gas processing plants. Natural gas being found devoid of propanes and butanes would be the exception to the norm and such a probability is quite remote.

We are assuming that at peak production approximately 4.4 billion cubic feet of gas will be produced per day. We have been informed that the optimum size for a gas processing plant is a capacity of 500 million cubic feet per day. Our discussions with industry and research of available literature have indicated that there are existing plants with considerably lower capacity and some plants with as much as 900 million cubic feet per day.

The major overall locational factors affecting gas processing plants are the proximity to the market, proximity to production, and the proximity to the gas distribution system. In the Mid-Atlantic coastal region there is an existing market and steadily increasing demand for natural gas and natural gas products. Therefore, the locating of gas processing plants within the Mid-Atlantic coastal region would be in closer proximity to the market demand area than any of the existing plants which presently supply the area with natural gas and natural gas products. Assuming the above statement to be true, the proximity to production and the distribution system would have to be considered. The optimum location, taking into account these two factors only, would be a site on a direct line between production and a distribution line.

Based upon pipeline economics, it is highly improbable that a gas processing plant would be located far from producing areas when closer locations are possible. New Jersey has the most extensively developed gas distribution system of the five States within the region. The location of its distribution system appears to be closer to the leasing area than the distribution systems of other States. Without knowing where production will actually take place, the selection of locations within New Jersey was the most rational choice. A number of counties within New Jersey

would have been suitable locations especially since gas processing plants would not require a shoreline site, therefore making locations within the State very flexible. In order to maximize impacts, it was decided that gas processing plants would be located in the same counties as the onshore terminals (Atlantic, Monmouth, Cape May, and Ocean Counties).

Five hundred million cubic feet per day capacity has been selected for the initial gas processing capacity at each site with the ability to expand on the same site to one billion cubic feet, therefore limiting the number of sites necessary and again maximizing impact. Due to the ease with which the expansion of gas processing plants can be accomplished we have included this type of development and expansion as part of our assumptions.

22. Production of gas is assumed to result in less curtailment of contracts in the Mid-Atlantic coastal region.

Natural gas consumption has historically been encouraged by a low regulated price, convenience, and cleanliness. Pipelines from the Gulf of Mexico and the Southwest carry natural gas to the Mid-Atlantic coastal region and were built to carry supplies at times of peak demand. A system was created whereby interruptible gas was supplied to industrial users. At times of peak demand, this gas supply would be diverted to household and commercial users with firm contracts at higher rates. In the 1970's, natural gas shortages

were felt by interruption of gas supplies to even firm contract users. To ensure themselves of a reliable energy source, some users found themselves in a pre-embargo shift to the use of oil. A heavy burden has been placed on the Mid-Atlantic coastal region by the curtailment of deliveries, inability to add new gas customers, and the importation of liquefied natural gas at a price higher than the domestic price. Gas production in the Baltimore Canyon OCS would serve to alleviate future gas problems in the Mid-Atlantic coastal region to some degree but would not remedy present problems in the area.

23. The offshore operating cost of oil is assumed to be \$2.65 per barrel and the offshore operating cost of gas is assumed to be \$.24 per thousand cubic feet.

These values were calculated by USGS as follows:

Gross value of oil and gas:

2,600,000,000 bbls of recoverable oil x
\$11.00/bbl = \$28,600,000,000

12,800,000,000 mcf of recoverable gas x
\$1.00/mcf = \$12,800,000

\$28.6 billion + \$12.8 billion = \$41.4 billion of
gross revenues

Annual Royalties:

oil- 130,000,000 bbls/yr x 1/6 x \$11.00/bbl = \$238,400,000
gas- 640,000,000 mcf/yr x 1/6 x \$1.00/mcf = \$106,700,000

Average Annual Operating Costs:

\$500,000,000 for royalty, labor, transportation,
workover, well servicing, equipment maintenance,
overhead, and miscellaneous (including a weather
factor)

It was assumed that operating costs for oil and gas are proportional
to their gross value:

Average Annual Operating Costs, oil

$$\frac{28.6}{41.4} \times \$500,000,000 = \$345,000,000$$
$$\frac{\$345,000,000/\text{yr}}{130,000,000/\text{bbls/yr}} = \$2.65/\text{bbl}$$

Average Annual Operating Costs, gas

$$\frac{12.8}{41.4} \times \$500,000,000 = \$155,000,000$$
$$\frac{\$155,000,000/\text{yr}}{640,000,000 \text{ mcf/yr}} = \$.24/\text{mcf}$$

24. Expenditure for pollution containment and pick-up equipment is assumed to be taken as follows:

- a. \$300,000 in 1976 in Philadelphia County, Pennsylvania
- b. \$470,000 in 1979 in Atlantic County, New Jersey
- c. \$470,000 in 1983 in Kings County, New York
- d. \$470,000 in 1985 in Monmouth County, New Jersey

One large fast response pollution containment and pick-up equipment unit can be expected to support exploration within an area with a 50 mile radius. This unit can be expected to be kept on a boat in the exploration area. Other pollution containment and pick-up equipment units can be expected to be used to support development and production. These units can be expected to be kept at operations bases and include equipment for foam generation, a shallow water skimmer, bird scare equipment, a boom, and other miscellaneous equipment. Pollution containment and pick-up equipment data is based on information provided by Clean Gulf Associates presently operating in the Gulf of Mexico.

25. An exploratory well is assumed to cost \$3,000,000 to drill. Platform and production equipment with installation is assumed to cost \$20,000,000. A development well is assumed to cost \$1,200,000 to drill.

These costs were allocated by year to those counties in which onland operations bases were assumed to be built. Exploratory well drilling costs were allocated during the initial years to those counties that were assumed to support the initial years of exploration.

The initial estimates provided to us by USGS for exploratory well drilling and development well drilling were lower than those indicated above. Recent drilling costs in the eastern Gulf of Mexico area suggested that an upward revision of these initial estimates would be more indicative of costs to be expected in the Mid-Atlantic area. The estimate for the cost of platforms and production equipment with installation was provided by USGS. This figure includes gathering lines, pumps, and other production equipment.

26. The cost of laying large pipelines offshore is assumed to be \$1,000,000 per mile. The cost of laying large pipelines onshore is assumed to be \$300,000 per mile.

These cost estimates are consistent with industry data. They are in the high cost range of pipelines that have been built in recent years.¹ Offshore pipeline costs were allocated by year to those terminal counties receiving the pipelines. Onland pipeline costs were allocated by year to those counties in which pipelines were assumed to be built.

¹See Oil and Gas Journal, August 18, 1975, p. 66.

27. An onland operations base able to support the production of 200,000 barrels of oil per day is assumed to cost \$2,800,000.

This estimate was provided by the Offshore Operators Committee. An onland operations base capable of supporting the production of 200,000 barrels of oil per day as well as exploration activities is assumed to have a range of service of approximately 125 miles. The total number of operations bases needed to support Baltimore Canyon activity would therefore be minimized.

28. A pipeline land terminal with a capacity of 200,000 barrels of oil per day is assumed to cost \$4,000,000.

The initial estimate provided by USGS included land costs. For purposes of the economic model land acquisition costs are regarded as a transfer of income and as such are not relevant inputs. An estimate of \$4,000,000 was considered to be a reasonable cost by USGS.

An even distribution of production was assumed from the OCS with the unitization of transport capacity being distributed accordingly. Some of industry's decisions will be based on uncertainty with regard to future prices, costs, and the level of resources that will be recovered over time. To allow for this uncertainty, total pipeline land terminal capacity was assumed to be 800,000 barrels per day as opposed to the 740,000 barrels per day needed to support peak production.

The value of the offshore oil production at the pipeline land terminal was calculated by year and county receiving the oil and used as input into the economic model. An average transportation cost

of \$.23 per barrel of oil was added to the \$11 per barrel wellhead cost.

Table 4 indicates the value of offshore oil production by year and county used as input into the economic model.

TABLE 4
Value Of Offshore Oil Production
At Pipeline Land Terminals
(\$ Million)

	<u>Atlantic County New Jersey</u>	<u>Monmouth County New Jersey</u>	<u>Cape May County New Jersey</u>	<u>Ocean County New Jersey</u>
1981	280.8			
1982	280.8	280.8		
1983	303.2	303.2	280.8	
1984	314.4	314.4	303.2	303.2
1985	393.1	393.1	393.1	393.1
1986	482.9	482.9	471.7	471.7
1987	617.7	617.7	617.7	617.7
1988	763.6	763.6	752.4	752.4
1989	763.6	763.6	752.4	752.4
1990	763.6	763.6	752.4	752.4

29. Gas processing capacity of 500 million cubic feet is assumed to cost \$40,000,000.

The Offshore Operators Committee has provided estimates for gas processing capacity of 300 million cubic feet. Our estimate is based on an assumption of constant returns to scale and is probably biased on the high cost side.

The value of offshore production at the gas processing area was calculated by year and county receiving the gas and used as input into the economic model. An average transportation cost of \$.02 per thousand cubic feet of gas was added to the \$1 per thousand cubic feet wellhead cost. Table 5 indicates the value of offshore gas production by year and county that was used as input into the economic model.

Table 5
Value of Offshore Gas Production
At Gas Processing Areas
(\$ Million)

	<u>Atlantic County</u> <u>New Jersey</u>	<u>Monmouth County</u> <u>New Jersey</u>	<u>Cape May County</u> <u>New Jersey</u>	<u>Ocean County</u> <u>New Jersey</u>
1981	20.4			
1982	20.4	20.4		
1983	47.9	47.9	46.9	
1984	153.0	153.0	153.0	153.0
1985	204.0	204.0	204.0	204.0
1986	255.0	255.0	255.0	255.0
1987	306.0	306.0	306.0	306.0
1988	357.0	357.0	358.0	357.0
1989	408.0	408.0	408.0	408.0
1990	408.0	408.0	408.0	408.0

The use of employment figures as input into the economic model is optional. Existing coefficients within the model express employment-output levels for the petroleum industry as a whole. It was felt that employment estimates specifically made for the Mid-Atlantic coastal region could be utilized by the economic model and would increase the accuracy of the results. Utilizing the assumptions described employment figures for the following categories were estimated by year and county from data provided by the Offshore Operators Committee:

1. Development well drilling
2. Exploratory well drilling
3. Gas processing
4. Onland operations base
5. Pipeline land terminal
6. Platform

The figures developed reflect primary non-construction jobs that would be associated with Baltimore Canyon activity as hypothesized. The employment data used as input into the economic model was calculated from the information provided in Table 6.

Table 6

Non-Construction Jobs Associated with Hypothetical Scenario

	Cumulative Exploratory			Cumulative Development			Platform		Oil	Gas	Onshore	Pipeline	Gas	Service	Office	Total
	Wells	Rigs	Employ	Wells	Rigs	Employ	Employ	No.	bbl/d (10 ³)	cf/d (10 ⁶)	Base Employ	Terminal Employ	Plant Employ	Support Employ	Employ	Employ
1976	20	8	904												23	927
1977	60	8	904												98	1023
1978	100	10	1130												174	1325
1979	160	10	1130	20	3	195					136	1			174	1656
1980	210	10	1130	60	7	455					136	1	17	1	174	1982
1981	260	10	1130	125	10	650	112	7	70	55	136	1	31	2	261	2463
1982	300	8	904	205	13	845	176	11	140	110	136	1	51	3	261	2562
1983	340	8	904	300	15	975	272	17	220	380	272	2	68	4	261	3032
1984	380	8	904	405	15	975	368	23	300	165	272	2	68	4	348	3215
1985	420	8	904	510	15	975	432	27	380	2190	408	3	68	4	348	3509
1986	460	8	904	605	13	845	496	31	465	2740	408	3	68	4	348	3579
1987	480	4	452	685	13	845	544	34	600	3290	408	3	68	4	348	3175
1988	500	4	452	755	10	650	592	37	740	3825	544	4	68	4	261	3077
1989	520	4	452	820	10	650	640	40	740	4385	544	4	68	4	261	3125
1990	540	4	452	850	5	325	672	42	740	4385	544	4	68	4	261	2832
1991	550	2	226	870	5	325	688	43	685	3290						
1992	560	2	226	880	2	130	704	44	600	2185						
1993	565	1	113						465	1095						
1994	570	1	113						300	1095						
1995	575	1	113						245	1095						
1996									165	875						
1997									110	765						
1998									70	660						
1999									40	550						
2000									40	435						

Table 7 summarizes the facilities and non-construction jobs associated with the hypothetical scenario developed.

Applying Table 7 to the assumptions described in this chapter, investment figures for the following categories were estimated by year and county and used as input into the economic model:

Service Port Employ	Office Employ	Total Employ
23		927
98	21	1023
74	21	1325
74	21	1656
74	21	1982
61	42	2463
61	42	2562
61	84	3032
48	84	3215
48	84	3509
48	126	3579
48	126	3175
61	126	3077
61	126	3125
61	126	2832

1. Development well drilling
2. Exploratory well drilling
3. Gas processing capacity
4. Onland operations base
5. Pipeline land terminal
6. Pipeline laying
7. Platform and production equipment with installation
8. Pollution containment and pick-up equipment

Special calculations were requested to facilitate the impact analysis. These included the calculation of the difference between the with Baltimore Canyon activity case and the base case and calculations of percentages.

Having described our application of the economic model in detail in Chapter II, we are now ready to present the results of the economic model in Chapter III.

Table 7

Facilities and New Non-Construction Jobs Associated with Hypothetical Scenario¹

	Exploratory Rigs Operating Each Year	Development Rigs Operating Each Year	Platforms on Stream	Peak Oil Thous. Bbls/d	Production Gas mmcf/d	Onshore Operations Bases	Pipeline Terminals ²	Gas Processing Plants (500 mmcf/d Units)	Employment ¹ Total Estimated to be Hired Regionally	
1976	8								927	346
1977	8								1023	776
1978	10								1325	588
1979	10	3				1			1656	1260
1980	10	7				1	1	1	1982	1451
1981	10	10		Production Begins		1	2	2	2463	2016
1982	8	13	11			1	3	3	2562	2216
1983	8	15	17			2	4	4	3032	2670
1984	8	15	23			2		4	3215	2968
1985	8	15	27			3		6	3509	3236
1986	8	13	31			3		8	3579	3305
1987	4	13	34			3			3175	3068
1988	4	10	37	740		4			3077	2945
1989	4	10	40	740	4400	4			3125	3018
1990	4	5	42	740	4400	4			2832	2726
1991	2	5	43							
1992	2	2	44							
1993	1									
1994	1									
1995	1									
2000				Production Ends						

¹Based on industry estimates on an operating and/or production unit basis. Estimates of regionally hired employees based on estimate of required and regionally available skills by job category. Employment includes: rig and platform crews and associated support crews, pipeline terminal operation crews, onshore base employees, gas processing plant employees, oil company employees—offices, support company employees, including: mud suppliers, wireline companies, logging and perforating companies, diving services, rental tool companies, fishing tool companies, downhole companies, supply stores, wellhead suppliers, as well as machine shops, trucking firms and cement companies, which are in addition to existing regional firms.

²To service 560 miles of marine pipeline and 240 miles of onshore pipeline in four corridors.

Employment¹

Total Estimated
to be
Hired
Regionally

927	346
1023	776
1325	588
1656	1260
1982	1451
2463	2016
2562	2216
3032	2670
3215	2968
3509	3236
3579	3305
3175	3068
3077	2945
3125	3018
2832	2726

te of required and
terminal operation crews,
suppliers, wireline com-
ply stores, wellhead

CHAPTER III

RESULTS OF THE ECONOMIC MODEL

The impact of the proposed sale on the regional economy as a whole was found to be minor. Changes of less than one percent from base case levels for most economic variables were found to occur. The greatest changes occurred in construction activity, the balance of payments, and private investment. These changes, however, were at the most only between one and three percent from base case levels. The impact of the proposed sale on several primary impact counties, however, was found to be significant suggesting that some problems stemming from a boom bust phenomenon could result in several localities. Detailed results of the economic model are presented in this section. Tables are provided in which data with development, without development, and differences for the years 1980, 1985 and 1990 are shown. Data are presented for the Mid-Atlantic coastal region as a whole, the coastal regions within each of the six states of the Mid-Atlantic area, selected counties and urban areas within the region. Due to the rounding of figures, totals may not be exactly equal to the sum of their parts and induced change levels may not be exactly equal to the differences between with and without development cases. In applying this data, it should be kept in mind that the results are based on the assumptions as described in Chapter II. The base case (without development) is compared to the with development case in order

to isolate for analytical purposes the induced changes that could be expected from potential Baltimore Canyon activity as hypothesized.

The first section of this chapter deals with the regional impacts of the hypothesized scenario. It begins with a table that summarizes the regional impacts that were shown by the economic model. A discussion of the impacts on the Mid-Atlantic coastal region then follows. The next section of this chapter deals with State coastal impacts. This section contains State coastal tables with data from the economic model. The impacts are then summarized with State summaries by State. The third section of this chapter deals with local impacts. It begins with general discussion of the impacts on localities. Impacts are then summarized and data from the economic model presented for Atlantic, Cape May, Monmouth, and Ocean Counties, New Jersey. A discussion of impacts on urban areas by State follows. The chapter is then concluded with a discussion on the implications for other possible scenarios. The following is a breakdown of the sections of this chapter by page number:

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A. REGIONAL IMPACTS

Table 8

MIDDLE ATLANTIC COASTAL REGION
SUMMARY OF CHANGES

	1980 Change ¹	1980 % Change ²	1985 Change ¹	1985 % Change ²	1990 Change ¹	1990 % Change ²
Population (Persons)	11,299	+ .04	7,036	+ .02	8,686	+ .03
Population Density (Persons per Square Mile)	1	+ .09	1	+ .08	1	+ .08
Civilian Labor Force (Persons)	4,957	+ .03	- 487	+ .00	6,211	+ .03
Civilian Persons Employed	8,363	+ .06	12,111	+ .08	12,277	+ .07
Civilian Unemployment Rate (Percent)	- .03	- .01	- .08	- .02	- .03	- .01
Earnings (Thousands of Dollars)	116,240	+ .07	171,912	+ .09	175,148	+ .08
Personal Income (Thousands of Dollars)	132,440	+ .07	187,834	+ .08	192,396	+ .07
Per Capita Income (Dollars)	2	+ .03	4	+ .05	4	+ .05
State and Local Government Expenditures and Purchases Excluding Construction and Employment Compensation (Thousands of Dollars)	4,623	+ .01	14,106	+ .03	21,253	+ .04
Construction (Thousands of Dollars)	362,363	+ 1.98	307,470	+ 1.52	101,467	+ .45
Equipment Purchases (Thousands of Dollars)	162,026	+ .80	188,482	+ .78	51,775	+ .18
Personal Consumption Expenditures (Thousands of Dollars)	73,754	+ .05	88,764	+ .05	92,448	+ .04
Private Investment (Thousands of Dollars)	523,709	+ 1.55	490,022	+ 1.26	150,255	+ .33
Foreign Competitive Imports (Thousands of Dollars)	0	0	- 820,438	- 2.35	- 1,582,274	- 2.98

MIDDLE ATLANTIC COASTAL REGION
Summary of Changes, con't.

	1980 Change ¹	1980 % Change ²	1985 Change ¹	1985 % Change ²	1990 Change ¹	1990 % Change ²
Domestic Output (Thousands of Dollars)	232,744	+ .06	1,561,668	+ .34	2,746,328	+ .52
Gross Regional Product (Thousands of Dollars)	208,344	+ .08	1,086,676	+ .35	1,833,408	+ .52
Total Demand (Thousands of Dollars)	578,220	+ .14	1,056,272	+ .21	1,216,528	+ .20
Total Supply (Thousands of Dollars)	232,804	+ .01	742,032	+ .15	1,165,640	+ .19

¹ Changes were calculated by subtracting the base case (without development) levels of each of the variables listed from the corresponding with development levels.

² Percentages were calculated by dividing the level of change for given variables and the corresponding base year values and multiplying by 100.

Impacts on Mid-Atlantic Coastal Region

The increase in population for the area as a whole can be described only as modest. Not all skills needed for Baltimore Canyon exploration, development, and production are found in the Mid-Atlantic coastal region. These skills are imported from outside the region. Population within the region is drawn during the early years of Baltimore Canyon activity to the New Jersey coastal regions where most land-based supporting facilities are assumed to be located. Offshore oil and gas activity induces increased economic activity throughout the period but a shift from heavy industrial activity in the earlier years to more service oriented economic activity during the later years occurs. In the later years population is drawn to more areas within the region. This is indicative of induced increases in economic activity being more widely distributed throughout the Mid-Atlantic coastal region during the later years of Baltimore Canyon activity.

Persons from outside the Mid-Atlantic coastal region are induced into the area by increased job opportunity. Coastal New Jersey is unable to permanently support or absorb the high number of persons entering into its area during the earlier years of Baltimore Canyon activity. Much of the remainder of the Mid-Atlantic coastal region is able to absorb these persons. Induced increases in income are experienced by the Mid-Atlantic coastal region as a whole. These increases become more widely distributed throughout the region over time.

Resources are attracted mostly to the coastal New Jersey region during the early years of Baltimore Canyon activity. These resources are mostly drawn from outside the Mid-Atlantic coastal region but a noticeable reallocation of resources from within the region to coastal New Jersey occurs during these early years. Resources are more widely distributed within the region as economic activity itself becomes more widely distributed within the region over time. More resources are drawn into the coastal State areas within the region during the later years of Baltimore Canyon activity than are drawn out of the coastal State areas in the earlier years. Private industry invests heavily in the Mid-Atlantic coastal region to support Baltimore Canyon activity. During the later years, private industry invests lesser amounts but to more areas than during the earlier years.

Greater Federal revenues are returning to localities as Baltimore Canyon oil and gas production moves toward peak levels. In general, increased State and local government activity within the Mid-Atlantic coastal region is needed to support Baltimore Canyon activity over time. The activities of some State and local governments^{rise} while those of others fall. Increased monies needed by some State and local governments are obtained by increased revenues generated by the increased level of economic activity.

Induced increases in petroleum refining activity (including gas processing) for the Mid-Atlantic coastal region as a whole is

greatest in 1985. Baltimore Canyon activity induces an increase in petroleum refining activity for the region as a whole. In 1985 and 1990, however, petroleum refining activity in some areas decreases suggesting the existence of some excess capacity and allocation problems in this sector.

The existing industrial sectors of iron, steel, other metals, machines, miscellaneous manufacturing, chemicals, and plastics are heavily relied upon during the initial years of Baltimore Canyon activity. The existence and proximity of these heavy industrial sectors to coastal New Jersey decreases the incentive for industry to build new heavy industry. Wholesale trade, retail stores, and transportation facilities face increased expansion throughout the region over time. The electric & gas utilities of the area show the benefits of Baltimore Canyon gas being available for the region's use over time.

The greatest induced increases of economic activity are in the petroleum mining and construction sectors. Much of the materials for platforms and wells is purchased from outside the Mid-Atlantic coastal region, shipped to the area, and constructed within the area. The most active construction sectors in the Mid-Atlantic coastal region include the oil and gas well drilling, gas and petroleum pipeline, and industrial construction sectors. As oil and gas production increases, induced increases in construction become more widely distributed within the Mid-Atlantic coastal region.

Those sectors purchasing the most equipment include the oil and gas well, construction, and transportation sectors. Wage rates paid in the construction sector have risen.

decrease in port activity is induced by the replacement of oil imports with Baltimore Canyon oil production. Improvements in the balance of payments increase as Baltimore Canyon oil production reaches peak levels. Other National benefits include a rise in National income and gross domestic product. Significant increases in economic activity outside of the Mid-Atlantic coastal region occur in the machines, miscellaneous manufacturing, iron, steel, other metals, chemicals, plastics, petroleum mining, and wholesale trade sectors. Baltimore Canyon oil and gas production allows the Mid-Atlantic coastal region to depend less on petroleum mining and petroleum refining sectors outside the region.

It is not likely that the area as a whole would experience a boom bust phenomenon. The impact of Baltimore Canyon activity on the Mid-Atlantic coastal area as a whole is not great enough to pose such a threat given the existing infrastructure, industrial base, and population found in the region. Our analysis shows, however, a significant increase in economic activities in those counties in which facilities were placed for purposes of analysis. For this reason, after a presentation of activities and effects on State coastal regions, an analysis of the impacts on these ^{primary} counties will be presented.

B. STATE COASTAL IMPACTS

	1 w Deve
Delaware	63
Maryland	3,42
New Jersey	7,69
New York	14,11
Pennsylvania	3,37
Virginia	1,40
Middle Atlantic Coastal Region	30,64

Table 9

STATE COASTAL REGIONS
Population Changes Induced By Development

	1980 with Development	1980 without Development	1980 Difference	1985 with Development	1985 without Development	1985 Difference	1990 with Development	1990 without Development	1990 Difference
Delaware	631,944	632,042	- 98	672,916	673,521	- 605	726,781	726,692	89
Maryland	3,424,573	3,425,210	- 637	3,715,299	3,715,077	222	4,045,854	4,047,284	- 1,430
New Jersey	7,695,501	7,680,538	14,963	8,359,312	8,346,239	13,073	9,062,164	9,055,609	6,555
New York	14,114,070	14,116,151	- 2,081	14,886,685	14,892,023	- 5,338	15,787,941	15,785,711	2,230
Pennsylvania	3,372,098	3,372,656	- 558	3,615,499	3,616,209	- 710	3,885,499	3,885,301	198
Virginia	1,401,995	1,402,284	- 289	1,500,268	1,499,875	393	1,618,985	1,617,939	1,046
Middle Atlantic Coastal Region	30,640,176	30,628,877	11,299	32,749,975	32,742,939	7,036	35,127,215	35,118,529	8,686

Table 10

STATE COASTAL REGIONS
Population Density Changes
Induced by Development
(Persons per Square Mile)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Delaware	Down 1	Down 1	-0-
Maryland	-0-	-0-	-0-
New Jersey	Up 3	Up 2	Up 2
New York	-0-	Down 1	-0-
Pennsylvania	-0-	Down 1	-0-
Virginia	-0-	-0-	Up 1
Middle Atlantic Coastal Region	Up 1	Up 1	Up 1

	1980 with Develop
Delaware	294,5
Maryland	1,606,7
New Jersey	3,689,6
New York	6,821,3
Pennsylvania	1,670,3
Virginia	486,2
Middle Atlantic Coastal Region	14,568,9

Table 11

STATE COASTAL REGIONS
Changes of Civilian Labor Force Induced By Development

	1980 with Development	1980 without Development	1980 Difference		1985 with Development	1985 without Development	1985 Difference		1990 with Development	1990 without Development	1990 Difference	
Delaware	294,549	294,583	-	34	326,431	326,700	-	269	365,638	365,692	-	54
Maryland	1,606,776	1,607,024	-	248	1,796,526	1,796,608	-	82	2,020,043	2,021,704	-	1,661
New Jersey	3,689,674	3,683,773		501	4,137,135	4,133,636		3,499	4,638,035	4,633,249		4,786
New York	6,821,389	6,821,737		348	7,625,302	7,628,176	-	2,876	8,532,081	8,529,243		2,838
Pennsylvania	1,670,307	1,670,556	-	249	1,849,697	1,850,485	-	788	2,055,877	2,056,001	-	124
Virginia	486,296	486,360	-	64	535,535	535,509		26	594,311	593,888		423
Middle Atlantic Coastal Region	14,568,988	14,564,031		4,957	16,270,625	16,271,112	-	487	18,205,983	18,199,772		6,211

Table 12

STATE COASTAL REGIONS
Changes of Civilian Persons Employed Induced By Development

	1980 with Development	1980 without Development	1980 Difference	1985 with Development	1985 without Development	1985 Difference	1990 with Development	1990 without Development	1990 Difference
Delaware	282,651	282,631	20	311,210	311,180	30	351,262	351,223	39
Maryland	1,533,971	1,533,880	91	1,705,992	1,705,253	739	1,928,865	1,927,574	1,291
New Jersey	3,503,074	3,496,142	6,932	3,898,026	3,890,000	8,026	4,405,082	4,398,948	6,134
New York	6,504,126	6,503,002	1,124	7,244,244	7,241,783	2,461	8,170,674	8,167,249	3,425
Pennsylvania	1,583,595	1,583,428	167	1,745,342	1,744,858	484	1,953,091	1,952,296	795
Virginia	466,488	466,459	29	510,188	509,818	370	569,149	568,556	593
Middle Atlantic Coastal Region	13,873,903	13,865,540	8,363	15,415,000	15,402,889	12,111	17,378,119	17,365,842	12,277

ut 1990
ment Difference

23 39

74 1,291

48 6,134

49 3,425

96 795

56 593

42 12,277

Table 13

STATE COASTAL REGIONS
Civilian Unemployment Rate Change
Induced by Development
(Percent)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Delaware	Down .02	Down .09	Down .03
Maryland	Down .02	Down .04	Down .15
New Jersey	Down .03	Down .11	Down .04
New York	Down .02	Down .07	No change
Pennsylvania	Down .03	Down .07	Down .04
Virginia	Down .02	Down .07	Down .04
Middle Atlantic Coastal Region	Down .03	Down .08	Down .03

Table 14

STATE COASTAL REGIONS
Changes In Earnings Induced By Development
(Thousands of Dollars)

	1980 with Development	1980 without Development	1980 Difference	1985 with Development	1985 without Development	1985 Difference	1990 with Development	1990 without Development	1990 Difference
Delaware	2,961,512	2,961,039	473	3,439,558	3,438,860	698	4,099,456	4,098,801	655
Maryland	16,447,441	16,445,422	2,019	19,127,893	19,116,871	11,022	22,606,901	22,588,984	17,917
New Jersey	39,339,732	39,248,781	90,951	45,786,201	45,677,322	108,879	54,120,937	54,035,506	85,431
New York	78,435,717	78,417,063	18,654	92,596,136	92,558,329	37,807	110,683,584	110,632,027	51,557
Pennsylvania	16,384,008	16,380,601	3,407	19,091,425	19,083,719	7,706	22,573,299	22,562,724	10,575
Virginia	5,864,314	5,863,581	733	6,662,688	6,656,897	5,791	7,704,882	7,695,866	9,016
Middle Atlantic Coastal Regions	159,432,690	159,316,450	116,240	186,703,870	186,531,958	171,912	221,789,018	221,613,870	175,148

Table 15

STATE COASTAL REGIONS
Changes In Personal Income Induced By Development
(Thousands of Dollars)

	1980 with Development	1980 without Development	1980 Difference	1985 with Development	1985 without Development	1985 Difference	1990 with Development	1990 without Development	1990 Difference
Delaware	3,834,760	3,834,406	354	4,428,571	4,428,374	197	5,250,395	5,249,763	632
Maryland	19,831,762	19,830,413	1,349	23,029,380	23,017,773	11,607	27,201,952	27,183,623	18,329
New Jersey	48,690,221	48,578,580	111,641	56,522,910	56,393,354	129,556	66,657,559	66,558,731	98,828
New York	103,630,276	103,614,481	15,795	121,200,538	121,167,693	32,845	143,803,908	143,750,716	53,192
Pennsylvania	20,915,424	20,912,559	2,865	24,251,404	24,244,228	7,176	28,558,135	28,547,450	10,685
Virginia	6,953,023	6,952,584	439	7,899,536	7,893,079	6,457	9,145,282	9,134,556	10,726
Middle Atlantic Coastal Region	203,855,428	203,722,988	132,440	237,332,300	237,144,466	187,834	280,617,176	280,424,780	192,396

Table 16

STATE COASTAL REGIONS
Changes In Per Capita Income Induced By Development
(Dollars)

	1980 with Development	1980 without Development	1980 Difference	1985 with Development	1985 without Development	1985 Difference	1990 with Development	1990 without Development	1990 Difference
Delaware	6068	6067	1	6581	6575	6	7224	7224	0
Maryland	5791	5790	1	6199	6196	3	6723	6717	6
New Jersey	6327	6325	2	6762	6757	5	7356	7350	6
New York	7342	7340	2	8142	8136	6	9108	9106	2
Pennsylvania	6202	6201	1	6708	6704	4	7350	7348	2
Virginia	4959	4958	1	5265	5262	3	5649	5646	3
Middle Atlantic Coastal Region	6653	6651	2	7247	7243	4	7989	7985	4

Table 17

STATE COASTAL REGIONS
Changes In Personal Consumption Expenditures Induced By Development
(Thousands of Dollars)

	1980 with Development	1980 without Development	1980 Difference	1985 with Development	1985 without Development	1985 Difference	1990 with Development	1990 without Development	1990 Difference
Delaware	2,777,813	2,778,229	- 416	3,318,602	3,319,740	- 1,138	4,072,438	4,073,300	- 862
Maryland	15,185,622	15,188,043	- 2,421	18,157,689	18,154,681	3,008	22,048,984	22,040,211	8,773
New Jersey	33,499,644	33,414,297	85,347	40,338,709	40,244,927	93,782	49,231,316	49,163,842	67,474
New York	85,576,160	85,582,551	- 6,391	103,150,376	103,158,644	- 8,268	125,836,311	125,827,828	8,483
Pennsylvania	16,203,558	16,205,135	- 1,577	19,406,654	19,407,827	- 1,173	23,553,983	23,551,696	2,287
Virginia	4,526,284	4,527,066	- 782	5,274,806	5,272,260	2,546	6,268,254	6,261,967	6,287
Middle Atlantic Coastal Region	157,769,044	157,695,290	73,754	189,646,806	189,558,042	88,764	231,011,254	230,918,806	92,448

Table 18

STATE COASTAL REGIONS
Changes In State and Local Government Expenditures and Purchases Induced By Development
(Excluding Construction and Employment Compensation)
(Thousands of Dollars)

	1980 with Development	1980 without Development	1980 Difference	1985 with Development	1985 without Development	1985 Difference	1990 with Development	1990 without Development	1990 Difference
Delaware	549,097	549,111	- 14	640,616	640,712	- 96	763,572	763,683	- 111
Maryland	3,384,592	3,384,757	- 165	3,927,290	3,926,851	439	4,636,603	4,634,574	2,029
New Jersey	8,007,763	8,003,104	4,659	9,349,851	9,336,241	13,610	11,063,861	11,048,759	15,102
New York	22,471,579	22,471,017	562	26,192,332	26,192,412	- 80	30,872,984	30,870,280	2,704
Pennsylvania	2,795,965	2,796,336	- 371	3,291,380	3,291,548	- 168	3,911,718	3,911,165	553
Virginia	937,601	937,648	- 47	1,062,963	1,062,562	401	1,230,513	1,229,538	975
Middle Atlantic Coastal Region	38,146,588	38,141,965	4,623	44,464,424	44,450,318	14,106	52,479,241	52,457,988	21,253

Table 19

STATE COASTAL REGIONS
Changes In Private Investment Induced By Developm
(Thousands of Dollars)

	1980 with Development	1980 without Development	1980 Difference	1985 with Development	1985 without Development	1985 Difference	1990 with Development	1990 without Development	1990 Difference
Delaware	757,770	757,793	- 23	891,729	891,857	- 128	1,072,151	1,072,223	72
Maryland	3,217,322	3,217,437	- 115	3,624,921	3,625,025	- 104	4,198,267	4,197,569	- 698
New Jersey	8,253,860	7,806,439	447,421	9,350,815	8,966,198	384,617	10,633,160	10,525,315	107,845
New York	18,057,036	17,981,691	75,345	21,046,216	20,940,304	105,912	24,890,976	24,849,406	41,570
Pennsylvania	3,153,948	3,152,842	1,106	3,652,882	3,653,284	- 402	4,324,919	4,325,168	- 249
Virginia	834,234	834,259	- 25	936,158	936,029	129	1,077,495	1,077,035	460
Middle Atlantic Coastal Region	34,274,166	33,750,457	523,709	39,502,712	39,012,690	490,022	46,196,959	46,046,704	150,255

Table 20

STATE COASTAL REGIONS
Changes In Construction Induced By Development
(Thousands of Dollars)

	1980 with Development	1980 without Development	1980 Difference	1985 with Development	1985 without Development	1985 Difference	1990 with Development	1990 without Development	1990 Difference
Delaware	526,122	526,131	- 9	575,983	576,090	- 107	645,733	645,780	- 47
Maryland	2,384,193	2,384,251	- 58	2,595,102	2,595,181	- 79	2,901,026	2,900,323	703
New Jersey	4,785,338	4,463,304	322,034	5,174,195	4,917,759	256,436	5,593,882	5,530,040	63,842
New York	8,651,653	8,612,316	39,337	9,653,645	9,602,283	51,362	10,928,170	10,891,774	36,396
Pennsylvania	1,565,486	1,564,408	1,078	1,751,393	1,751,626	- 233	1,993,855	1,993,681	174
Virginia	747,306	747,324	- 18	811,546	811,456	90	901,620	901,221	399
Middle Atlantic Coastal Region	18,660,095	18,297,732	362,363	20,561,860	20,254,390	307,470	22,964,281	22,862,814	11,467

Table 21

STATE COASTAL REGIONS
Changes In Equipment Purchases Induced By Development
(Thousands of Dollars)

	1980 with Development	1980 without Development	1980 Difference	1985 with Development	1985 without Development	1985 Difference	1990 with Development	1990 without Development	1990 Difference
Delaware	389,963	389,978	- 15	488,217	488,278	- 61	619,211	619,253	- 42
Maryland	1,469,255	1,469,333	- 78	1,729,927	1,729,957	- 30	2,086,501	2,086,222	281
New Jersey	4,433,644	4,307,557	126,087	5,278,789	5,144,259	134,530	6,311,536	6,265,329	46,207
New York	11,748,469	11,712,394	36,075	14,010,719	13,956,492	54,227	16,939,921	16,934,155	5,766
Pennsylvania	2,009,180	2,009,209	- 29	2,381,984	2,382,228	- 244	2,887,809	2,888,150	- 341
Virginia	339,265	339,279	- 14	399,714	399,654	60	483,596	483,391	205
Middle Atlantic Coastal Region	20,389,772	20,227,746	162,026	24,289,346	24,100,864	188,482	29,328,572	29,276,797	51,775

Table 22

STATE COASTAL REGIONS
Changes In Foreign Competitive Imports Induced By Development
(Thousands of Dollars)

	1980 with Development	1980 without Development	1980 Difference	1985 with Development	1985 without Development	1985 Difference	1990 with Development	1990 without Development	1990 Difference
Delaware	82,247	82,247	-0-	90,820	90,820	-0-	103,131	103,131	-0-
Maryland	2,340,864	2,340,864	-0-	3,365,894	3,365,894	-0-	5,004,427	5,004,427	-0-
New Jersey	3,938,392	3,938,392	-0-	5,112,087	5,326,796	-214,709	7,093,153	7,507,234	- 414,081
New York	15,654,470	15,654,470	-0-	20,276,882	20,472,392	-195,510	27,537,123	27,914,178	- 377,055
Pennsylvania	3,504,978	3,504,978	-0-	3,794,371	4,204,591	-410,219	4,423,955	5,215,092	- 791,137
Virginia	1,176,329	1,176,329	-0-	1,427,911	1,427,911	-0-	1,797,438	1,797,438	-0-
Middle Atlantic Coastal Region	26,697,279	26,697,279	-0-	34,067,963	34,888,401	-820,438	45,959,224	47,541,498	-1,582,274

Table 23

STATE COASTAL REGIONS
Changes In Gross Regional Product By Induced Development
(Thousands of Dollars)

	1980 with Development	1980 without Development	1980 Difference	1985 with Development	1985 without Development	1985 Difference	1990 with Development	1990 without Development	1990 Difference
Delaware	4,988,921	4,988,633	288	6,004,365	6,003,834	531	7,424,084	7,423,288	796
Maryland	22,483,712	22,482,786	926	27,142,453	27,131,484	10,969	33,352,020	33,332,230	19,790
New Jersey	56,326,406	56,158,966	167,440	68,386,065	67,396,422	989,643	83,857,789	82,188,273	1,669,516
New York	140,288,922	140,252,864	36,058	163,841,842	163,770,568	71,274	195,244,062	195,125,296	118,766
Pennsylvania	26,421,304	26,418,045	3,259	31,105,588	31,097,552	8,036	37,310,112	37,296,065	14,047
Virginia	7,090,993	7,090,616	377	8,230,231	8,224,008	6,223	9,771,317	9,760,838	10,479
Middle Atlantic Coastal Region	257,600,222	257,391,878	208,344	304,710,480	303,623,804	1,086,676	366,959,320	365,125,912	1,833,408

Table 24

STATE COASTAL REGIONS
Changes In Domestic Output Induced By Development
(Thousands of Dollars)

	1980 with Development	1980 without Development	1980 Difference	1985 with Development	1985 without Development	1985 Difference	1990 with Development	1990 without Development	1990 Difference
Delaware	9,135,831	9,135,193	638	11,060,258	11,059,775	483	13,735,868	13,735,286	582
Maryland	30,702,520	30,700,104	2,416	37,277,672	37,271,248	6,424	46,118,243	46,107,946	10,297
New Jersey	92,347,705	92,167,841	179,864	112,199,809	110,732,146	1,467,663	137,799,168	135,213,090	2,586,078
New York	205,007,514	204,964,744	42,770	240,909,180	240,830,580	78,600	288,981,920	288,840,944	140,976
Pennsylvania	45,688,502	45,682,341	6,161	54,356,875	54,351,849	5,026	65,765,717	65,762,508	3,209
Virginia	9,157,158	9,156,259	899	10,966,244	10,962,767	3,477	13,413,397	13,408,211	5,186
Middle Atlantic Coastal Region	392,039,160	391,806,416	232,744	466,769,960	465,208,292	1,561,668	565,814,176	563,067,848	2,746,328

Table 25

STATE COASTAL REGIONS
Changes In Total Demand Induced By Development
(Thousands of Dollars)

	1980 with Development	1980 without Development	1980 Difference	1985 with Development	1985 without Development	1985 Difference	1990 with Development	1990 without Development	1990 Difference
Delaware	8,781,001	8,781,713	- 712	10,655,966	10,653,970	1,996	13,265,722	13,258,134	7,588
Maryland	35,095,160	35,098,720	- 3,560	42,179,729	42,180,000	- 271	51,713,894	51,708,397	5,497
New Jersey	91,130,563	90,606,467	524,096	110,299,062	109,323,730	975,332	135,261,300	134,121,603	1,139,697
New York	221,098,070	221,037,100	60,970	267,590,426	267,538,004	52,422	329,372,496	329,373,636	- 1,140
Pennsylvania	45,617,116	45,618,448	- 1,332	55,039,040	55,014,907	24,133	67,406,057	67,348,334	57,723
Virginia	12,678,125	12,679,364	- 1,239	15,198,912	15,196,269	2,643	18,602,776	18,595,626	7,150
Middle Atlantic Coastal Region	414,399,968	413,821,748	578,220	500,963,072	499,906,800	1,056,272	615,622,128	614,405,600	1,216,528

Table 26

STATE COASTAL REGIONS
Changes In Total Supply Induced By Development
(Thousands of Dollars)

	1980 with Development	1980 without Development	1980 Difference	1985 with Development	1985 without Development	1985 Difference	1990 with Development	1990 without Development	1990 Difference
Delaware	9,221,134	9,220,495	639	11,155,118	11,154,629	489	13,844,479	13,843,883	596
Maryland	33,074,895	33,072,480	2,415	40,685,398	40,678,850	6,548	51,179,124	51,168,566	10,558
New Jersey	96,339,001	96,159,109	179,892	117,380,120	116,126,923	1,253,197	144,982,054	142,809,636	2,172,418
New York	220,796,680	220,753,906	42,774	261,360,726	261,477,272	- 116,546	316,749,380	316,984,700	- 235,320
Pennsylvania	49,215,258	49,209,099	6,159	58,179,821	58,584,963	- 405,142	70,227,732	71,015,545	- 787,813
Virginia	10,344,607	10,343,709	898	12,408,724	12,405,229	3,498	15,230,305	15,225,078	5,227
Middle Atlantic Coastal Region	418,991,512	418,758,708	232,804	501,169,828	500,427,796	742,032	612,212,936	611,047,296	1,165,640



State Summary - Delaware

Delaware 1980:

1. Population is drawn from Delaware to the coastal areas of New Jersey by increased job opportunities.
2. Economic activity in the construction, iron, steel, other metals, chemicals, plastics, machines, and miscellaneous manufacturing sectors of Delaware increases to support OCS activities.
3. The population of Delaware receives greater income from the expanded economic activity.
4. Resources are being drawn from Delaware to support Baltimore Canyon activity.
5. All of the increase in the supply of goods and services in Delaware stems from domestic production within the State.

Delaware 1985:

1. More persons from Delaware are being drawn from the State to support Baltimore Canyon activity elsewhere in the Mid-Atlantic coastal region.
2. Economic activity in the construction, iron, steel, other metals, chemicals, plastics, machines, and miscellaneous manufacturing sectors of Delaware is still being expanded to support Baltimore Canyon activity. In addition, retail store and wholesale trade activity is expanding.
3. The population of Delaware continues to receive more income from the expanded economic activity.
4. Resources continue to be drawn from Delaware to support Baltimore Canyon activity.
5. Most of the induced increase in the goods and services produced in Delaware stems from domestic production within the State.

Delaware 1990:

1. Population is being drawn back into Delaware to support the increased economic activity within the State.
2. Not as much increased economic activity in the iron, steel, other metals, construction, machines, and miscellaneous manufacturing sectors is needed to support Baltimore Canyon activity. Increased economic activity, however, is still required in the chemicals and plastics sectors. Economic activity in the retail store and wholesale trade sectors is expanding.
3. The population of Delaware receives even greater income from the expanded economic activity.
4. Resources are still being drawn from Delaware to support economic activity elsewhere in the area.
5. Most of the induced increase in goods and services produced in Delaware still stems from domestic production within the state.

State Summary - Coastal Maryland

Coastal Maryland 1980:

1. Population is being drawn to coastal New Jersey to support Baltimore Canyon activity.
2. Induced increases of economic activity occur mostly in the iron, steel, other metals, machines, and miscellaneous manufacturing sectors while an induced decrease of economic activity occurs in the construction sector.
3. Higher levels of economic activity are raising the amount of income being received by the remaining coastal Maryland population.
4. Resources are being drawn from coastal Maryland to coastal New Jersey.
5. Only approximately 1/3 of the value of induced increases in output in coastal Maryland is due to production from within the area.

Coastal Maryland 1985:

1. There is a net migration of population into coastal Maryland suggesting increased economic opportunity within the State.
2. Heavy industrial activity continues to grow in the iron, steel, other metals, machines, and miscellaneous manufacturing sectors. New increased economic activity is occurring in the transportation, retail store, and wholesale trade sectors.
3. The amount of income being received by those persons living in coastal Maryland is being increased by Baltimore Canyon associated activity.
4. Resources are being drawn to coastal Maryland reflecting growing economic activity.
5. Induced increases of goods and services being produced in coastal Maryland are now being exported out of the area.

Coastal Maryland 1990:

1. There is a net population migration out of coastal Maryland again.
2. Increased heavy industrial activity in the iron, steel, machines, and miscellaneous manufacturing sectors is still occurring. Significant expansion of economic activity in the retail store, wholesale trade, and transportation sectors is taking place. Lesser economic expansion in the auto dealers, service station, and communications sectors is also occurring.
3. Construction activity is growing in the residential, offices, stores, highway, sewer and water systems, and other public construction sectors.
4. Resources are still being attracted to coastal Maryland to support expanding Baltimore Canyon related economic activity.
5. State and local government activity is being expanded by Baltimore Canyon related activity.
6. Induced increases of goods and services being produced in coastal Maryland are available for export out of the area.

State Summary - Coastal New York

Coastal New York 1980:

1. Persons are being drawn from coastal New York to coastal New Jersey by increased economic opportunity.
2. Increased economic activity in the construction, iron, steel, other metals, machines, miscellaneous manufacturing, transportation, wholesale trade, and retail stores sectors are used to support Baltimore Canyon activity.
3. Income being received by those remaining in coastal New York is increased.
4. Materials for platforms and wells are purchased from outside the area, shipped to New York, and constructed in the area.
5. Resources to support Baltimore Canyon activity are drawn to some sectors in coastal New York and flow to other sectors outside of coastal New York.
6. Private industry is investing in coastal New York to ensure that economic activity is being increased to needed levels.

Coastal New York 1985:

1. Persons are being drawn out of coastal New York to an even greater extent.
2. Increased induced economic activity in the retail stores, wholesale trade, machines, miscellaneous manufacturing, other metals, and transportation sectors occurs in coastal New York. Induced economic activity also occurs in the finance, insurance, real estate, chemicals, and plastics sectors.
3. Induced equipment purchases and construction activities for offshore oil and gas activity is increasing.
4. An induced increase of income for those living in the New York coastal region is caused by Baltimore Canyon activity.
5. Resources are still being drawn from coastal New York to other areas within the Mid-Atlantic coastal region.

6. Private industry is investing an even greater amount in coastal New York.
7. A large induced decrease in port activity occurs as Baltimore Canyon oil production replaces imported oil. A balance of payments improvement results.

Coastal New York 1990:

1. Persons are being drawn back into the New York coastal region suggesting increased economic opportunity.
2. Induced construction, retail stores, petroleum mining, wholesale trade, machine, miscellaneous manufacturing, transportation, finance, insurance, and real estate economic activity continues to be high.
3. Induced equipment purchases have diminished significantly.
4. An even greater increase in income is induced by Baltimore Canyon related activity.
5. Resources are now flowing into coastal New York to support economic activity.
6. Baltimore Canyon related private investment in coastal New York is not as great but still at a significant level.
7. An even greater decrease in port activity results from the replacement of imports by Baltimore Canyon oil production. A balance of payments improvement results accordingly.
8. State and local government activity is being expanded by Baltimore Canyon related activity.

State Summary - Coastal Pennsylvania

Coastal Pennsylvania 1980:

1. Population is being induced to move out of coastal Pennsylvania by increased economic opportunity elsewhere in the Mid-Atlantic coastal region.

2. Economic activity within coastal Pennsylvania, however, is being induced mostly in the construction, iron, steel, other metals, machines, miscellaneous manufacturing, and retail stores sectors.
3. The coastal Pennsylvania population is receiving higher income due to Baltimore Canyon related activity.
4. Resources are being drawn away from coastal Pennsylvania to coastal New Jersey.
5. Private industry is investing to ensure that economic activity in coastal Pennsylvania is able to support Baltimore Canyon activity during the initial years.
6. A little less than half of the value of all coastal Pennsylvania output results from production within the coastal Pennsylvania area.

Coastal Pennsylvania 1985:

1. An even greater number of persons are being induced to leave coastal Pennsylvania for economic opportunity elsewhere.
2. Baltimore Canyon related economic activity in coastal Pennsylvania increases significantly in the retail stores, wholesale trade, transportation, chemicals, and plastics sectors. Other induced increases of economic activity are experienced in the iron, steel, other metals, finance, insurance, and real estate sectors.
3. Greater income is still being received by those remaining in coastal Pennsylvania.
4. Resources are being drawn from coastal Pennsylvania to other areas within the Mid-Atlantic coastal region to support Baltimore Canyon activity.
5. Induced increases of goods and services produced within coastal Pennsylvania are available for export out of the State coastal area.
6. Induced port activity decreases stem from the replacement of imported oil with Baltimore Canyon oil production. An improvement in the balance of payments results.

Coastal Pennsylvania 1990:

1. Persons are being drawn into coastal Pennsylvania by increased Baltimore Canyon related economic activity.
2. Significant induced increases of economic activity is experienced in the retail stores, finance, insurance, real estate, wholesale trade, transportation, chemicals, and plastics sectors. Economic activity in the iron, steel, other metals, machines, and miscellaneous manufacturing is being increased but at levels that are lower than before.
3. Induced income increases being received by coastal Pennsylvanians are even greater.
4. Resources are being drawn into coastal Pennsylvania.
5. Induced increases of goods and services produced within coastal Pennsylvania are available for export out of the State coastal area to areas within the Mid-Atlantic coastal region where they are needed.
6. An even greater induced decrease of port activity stems from the replacement of oil imports with Baltimore Canyon oil production. An even greater improvement in the balance of payments results.

State Summary - Coastal Virginia

Coastal Virginia 1980:

1. Population is being drawn from coastal Virginia by increased economic opportunity elsewhere in the Mid-Atlantic coastal region.
2. Increased economic activity within coastal Virginia is being induced mostly in the machines, and miscellaneous manufacturing sectors.
3. The coastal Virginia population is receiving higher income due to Baltimore Canyon related activity.
4. Resources are being drawn away from coastal Virginia to coastal New Jersey.
5. Less than 1/2 of the value of all coastal Virginia output stems from production within the coastal Virginia area.

Coastal Virginia 1985:

1. Population is now being induced to move into coastal Virginia by increased economic opportunity within the coastal Virginia area.
2. Increased economic activity within coastal Virginia is now being induced in the retail stores, wholesale trade, transportation, auto dealers, service station, and construction sectors as well as the machines and miscellaneous manufacturing sectors.
3. Induced increases of income are higher in coastal Virginia.
4. Resources are being drawn into coastal Virginia by increased economic opportunity within the coastal Virginia region.
5. Induced coastal Virginia production of goods and services is available for export to other areas within the Mid-Atlantic coastal region.

Coastal Virginia 1990:

1. Population is being drawn to coastal Virginia in greater numbers by increased economic opportunity within coastal Virginia.
2. Increased economic activity within coastal Virginia continues to be induced at a greater level in the retail stores, wholesale trade, transportation, auto dealers, service station, and construction sectors. The increased economic activity within the machines and miscellaneous manufacturing sectors is being induced at a lower level.
3. Induced increases of income are even higher in coastal Virginia.
4. An even greater amount of resources are being drawn into coastal Virginia by the increased economic opportunity within the coastal Virginia area.
5. An even greater amount of induced coastal Virginia production of goods and services is available for export to other areas within the Mid-Atlantic coastal region.

State Summary - Coastal New Jersey

Coastal New Jersey 1980:

1. Population is being drawn from within and outside of the region to coastal New Jersey by increased economic opportunity.
2. Increased economic activity within coastal New Jersey is being induced in the construction, retail stores, wholesale trade, transportation, machines, miscellaneous manufacturing, auto dealers, service station, and other metals sectors. Products from heavy industry are being imported into coastal New Jersey.
3. Induced increases of income are substantial in coastal New Jersey.
4. Resources are being drawn to coastal New Jersey from within the Mid-Atlantic coastal region and from outside the region. A greater proportion of the resources being drawn to coastal New Jersey have their origin outside the region.
5. Nearly 9/10 of the value of the output of coastal New Jersey stems from production within coastal New Jersey.
6. Private industry is investing heavily in coastal New Jersey to ensure that the level of economic activity is great enough to support Baltimore Canyon activity.
7. Materials for platforms and wells are purchased from outside coastal New Jersey, shipped to the area, and constructed in the area.
8. The most active construction sectors include the gas and petroleum pipeline, oil and gas well drilling, and industrial construction sectors.

Coastal New Jersey 1985:

1. Population levels in coastal New Jersey are greater with development than without development but there is a net migration out of coastal New Jersey occurring suggesting that coastal New Jersey is unable to absorb all of the persons entering into the area during the early years of Baltimore Canyon activity.

2. Increased economic activity is being induced within coastal New Jersey in the petroleum mining, construction, transportation, retail stores, wholesale trade, machines, miscellaneous manufacturing, other metals, auto dealers, and service station sectors.
3. Induced increases of income are even higher in coastal New Jersey.
4. Resources are still being drawn into coastal New Jersey to support Baltimore Canyon activity.
5. Nearly 1/3 of the materials needed for the production of coastal New Jersey's output is imported from outside coastal New Jersey.
6. Equipment is still being purchased by the oil and gas well and construction sectors. Equipment is also being purchased by the transportation sector to support Baltimore Canyon activity.
7. Induced coastal New Jersey production of goods and services has increased significantly.
8. Private industry is still investing heavily in coastal New Jersey to support Baltimore Canyon activity.
9. The most active construction sectors include the oil and gas well drilling sector, industrial, and residential construction sectors.
10. State and local government activity is being expanded by Baltimore Canyon related activity.
11. A large decrease in induced port activity results from the replacement of imported oil by Baltimore Canyon oil production. A balance of payments improvement results.

Coastal New Jersey 1990:

1. The induced increase in population is 1/2 as great as the 1985 level. An even greater net migration out of coastal New Jersey is occurring.

2. Induced increases of economic activity in the construction, wholesale trade, retail stores, and other metals sectors have declined while induced increase of economic activity in the petroleum mining, transportation, auto dealers, service station, machines, and miscellaneous manufacturing sectors have risen. The electric and gas utility sectors show a rise in induced economic activity. A noticeable decrease in the economic activity of the finance, insurance, and real estate sectors has occurred suggesting that resources have been drawn from this sector into other sectors within coastal New Jersey.
3. Induced increases of income are still occurring in coastal New Jersey.
4. Resources are still being drawn to coastal New Jersey but at lower levels.
5. 1/3 of the materials needed for the production of coastal New Jersey's output is still imported from outside coastal New Jersey.
6. Equipment is still being purchased by the oil and gas well and transportation sectors.
7. Private industry is still investing its money in coastal New Jersey but at a lower level.
8. The oil and gas well drilling sector is the most active construction sector in coastal New Jersey.
9. An even larger decrease in induced port activity occurs as Baltimore Canyon oil production is at peak levels. A balance of payments improvement results accordingly.

C. LOCAL IMPACTS

Major Impacts on Localities

In order for the reader to understand what has caused varying levels of economic activities in the counties analyzed, the following is a summary of activities assumed to have occurred at given points of time by locality:

By 1980, exploration activity has been moved from the ports of New York/New Jersey and the Delaware River to the newly built operations base in Atlantic County, New Jersey. Significant finds of oil and gas deposits have resulted in the development of oil and gas reserves. A pipeline terminal and gas processing plant in Atlantic County, New Jersey has been built in preparation for oil and gas production in 1981. An oil pipeline has been built to a refinery in the Delaware River Basin. A gas pipeline has been/to the existing gas distribution system in Atlantic County, New Jersey. Pollution containment and pick up equipment investment has been taken to support Baltimore Canyon exploration and development activity. Offshore exploration activity is at its peak level. Heavy industrial activity is being stimulated throughout the Mid-Atlantic coastal region.

By 1985, operations bases have been built in Kings County, New York and Cape May County, New Jersey to support offshore operations. Additional onland terminals have been built in Monmouth, Cape May, and Ocean Counties in New Jersey to receive increased oil production from the Baltimore Canyon. Oil pipelines have been built across onland

areas to refineries in the northern New Jersey and Delaware River Basin regions. New gas processing plants have been built in Monmouth, Cape May, and Ocean Counties in New Jersey. Additional gas processing capacity has been added in 1985 at the Atlantic County and Monmouth County gas processing areas. Further pollution containment and pick-up equipment investment has been taken in Kings County, New York and Monmouth County, New Jersey. Offshore exploration activity has diminished somewhat while development drilling is at its peak level. Employment directly related to offshore activity is also at its peak level. Heavy industrial activity needed to support offshore operations is diminishing while lighter industrial and service-oriented activity is expanding.

By 1990, oil and gas production from the Baltimore Canyon has reached peak levels. Another operations base has been built in Monmouth county, New Jersey. Gas processing capacity has been expanded in Cape May and Ocean Counties, New Jersey. Light industrial and service-oriented activity has expanded. The availability of gas has led to the expansion in some areas of the petrochemical industry. A more area specific look at the induced effects of offshore development is warranted so as to isolate some of the more local trends.

Atlantic and Cape May counties experience the greatest percentage increase of population from base case levels during the initial years of Baltimore Canyon activity. Ocean County shows a decrease

in population from base case levels for all years. In 1985, Atlantic County experiences a significant movement of persons out of the county while Cape May County is still experiencing an influx of persons into its county. By 1990, persons are leaving all four New Jersey coastal counties as economic opportunity expands in other areas.

The labor skills found in the four coastal New Jersey counties are drawn upon to support Baltimore Canyon activity. Civilian unemployment rates in all counties are significantly decreased by increased economic opportunity. Cape May County experiences the greatest percentage increase of persons employed from base case levels for all years. Some of the persons entering Atlantic County to work associated with short-term early OCS related activities, for example, can be expected to move into other primary impact areas where their skills are needed.

The construction of needed infrastructure occurs only after a knowledge of the number of persons that can be expected to remain over time becomes evident. The initial influx of persons into Atlantic, Cape May, and Monmouth Counties does not stimulate large immediate increases in infrastructure expenditures. Persons can be expected to utilize any excess capacity of services that may exist in surrounding areas. Major urban centers are within driving distances and mobility of population and materials lessens the chance for problems that may be created by shortages of supply. Monmouth County is the most

densely populated area of the four New Jersey coastal counties and as such could be expected to have the greatest ease in absorbing its increase in population.

In comparison to the existing level of investment activity, Cape May County experiences the greatest percentage injection of dollars into its expenditure stream. Large increases of consumption expenditure and income from base case levels indicate that Cape May County is likely to experience the greatest impact from Baltimore Canyon activity. Atlantic County is likely to experience the second greatest impact from Baltimore Canyon activity. Summary tables and a written summary of the impacts on each of the four counties is now provided. More detailed tables are then presented for Atlantic, Cape May, and Monmouth Counties. More detailed data for Ocean County is not presented because most impacts within Ocean County are less than 1 percent from base case levels. Only the processing of gas and transporting of oil have a major impact on the county.

Table 27

Summary of Induced Effects
Atlantic County, New Jersey
(Percent Change)

		<u>1980</u>	<u>1985</u>	<u>1990</u>
Population	+	5.60	+ 2.87	+ 1.78
Population Density	+	5.73	+ 2.80	+ 1.81
Net Population Migration	+	439.13	- 154.84	- 35.34
Civilian Labor Force	+	5.72	+ 2.83	+ 1.69
Civilian Persons Employed	+	6.40	+ 2.89	+ 1.67
Civilian Unemployment Rate	-	9.07	- 1.20	- .84
Earnings	+	9.30	+ 4.32	+ 2.44
Personal Income	+	8.40	+ 3.70	+ 2.24
Property Income	+	8.23	+ 3.59	+ 2.12
Per Capita Income	+	2.65	+ .80	+ .45
State and Local Government Expenditures and Purchases (Excluding Construction and Employee Compensation)	+	1.11	+ 1.64	+ 1.70
Personal Consumption Expenditures	+	7.05	+ 3.68	+ 1.87
Private Investment	+	150.50	76.57	+ 11.96
Construction	+	183.12	+ 63.12	+ 16.16
Equipment Purchases	+	46.46	+ 62.69	+ 3.05
Gross Regional Product	+	8.50	+ 21.04	+ 23.42
Domestic Output	+	6.58	+ 10.34	+ 33.81
Total Supply	+	6.44	+ 22.35	+ 33.82
Total Demand	+	17.13	+ 14.87	+ 12.85

Local Summary -- Atlantic County, New Jersey

Atlantic County, New Jersey 1980

1. A significant number of persons have been attracted to Atlantic County, New Jersey by increased economic opportunity.
2. Increased economic activity has been induced in the construction, transportation, retail stores, wholesale trade, auto dealers, and service station sectors.
3. The greatest construction sector increases have been induced in the gas and petroleum pipelines, oil and gas well drilling, and industrial construction sectors.
4. Induced increases of infrastructure construction are minimal. The influx of persons into Atlantic County, New Jersey has not stimulated a great expansion of construction activity in the residential, offices, stores, highway, sewer and water systems, conservation, and public construction sectors.
5. The greatest induced equipment purchases are found in the oil and gas well and construction equipment purchasing sectors. Smaller increases occur in the transportation and trade equipment sectors.
6. Resources are being drawn to Atlantic County, New Jersey from within and outside the Mid-Atlantic coastal region.
7. Private industry invests heavily in Atlantic County, New Jersey to support Baltimore Canyon activity.

8. Induced increases of income occur in Atlantic County, New Jersey.
9. Induced Baltimore Canyon State and local government activity increases.
10. Increased Federal government monies are spent in Atlantic County, New Jersey.

Atlantic County, New Jersey 1985

1. While the number of persons remaining in Atlantic New Jersey County, is greater than without development a significant number of persons who have entered the county during the early years of Baltimore Canyon activity are migrating to other areas. The great influx of persons into the county during the early years cannot be considered permanent. Some of these persons may be expected to carry skills that could be utilized in other areas over time to support Baltimore Canyon activity.
2. With the exception of gas processing plants, heavy industry has not been stimulated in Atlantic County, New Jersey. The demand for products from these heavy industries has been met by an expansion of existing heavy industries elsewhere within the Mid-

Atlantic coastal region and outside the region.

3. Economic activity has been increased by Baltimore Canyon activity in the petroleum mining, petroleum refining (gas processing), transportation, wholesale trade, retail stores, and construction sectors.
4. The electric and gas utility sectors experience an increase in economic activity, due to the greater availability of gas within Atlantic County, New Jersey.
5. The chemicals and plastics sectors in Atlantic County, New Jersey experience a decrease in activity suggesting that the county does not enjoy a comparative advantage with regard to the production of chemicals and plastics.
6. Resources are attracted to the county from other areas within the Mid-Atlantic coastal region and outside the region. Resources are also drawn from the finance, insurance, and real estate sectors within the county to other sectors.
7. Construction activity has been increased in the industrial and oil and gas well drilling construction sectors.

8. The construction industry has not reacted immediately to the large increase in population experienced in the early years. A slow moderate increase in infrastructure expenditures occurs over time to support increased population within Atlantic County, New Jersey.
9. Induced equipment purchases occur in the oil and gas well, construction, transportation, trade, and utility equipment purchasing sectors.
10. Private industry is still investing heavily in Atlantic New Jersey County, although the amount is not as great as previous levels.
11. Induced increases in income are occurring but at lesser levels suggesting that increased economic opportunity within Atlantic County, New Jersey is not being sustained by Baltimore Canyon activity.
12. Increased domestic production within Atlantic County, New Jersey is being sustained.
13. Induced state and local government activity is steadily growing.
14. Increased Federal government monies are spent in Atlantic County, New Jersey as oil and gas production from the Baltimore Canyon increases.

Atlantic County, New Jersey 1990

1. The number of persons remaining within Atlantic County, New Jersey is greater than without development. The net population migration out of the county continues but to a lesser degree.
2. Economic activity has continued to be increased by Baltimore Canyon activity in the petroleum mining, petroleum refining (gas processing), transportation, wholesale trade, retail stores, and construction sectors.
3. The electric gas utility sector shows an even greater increase in economic activity as gas produced from the Baltimore Canyon is available at peak levels.
4. Resources are still being drawn to Atlantic County, New Jersey but to a lesser degree.
5. An even greater amount of resources are being drawn from the finance, insurance, and real estate sectors within Atlantic County, New Jersey.
6. Induced increases in construction activity still occurs in the oil and gas well drilling construction sector.

7. Increased infrastructure construction is seen to be stabilized as population levels themselves are stabilized.
8. Induced equipment purchases are greatest in the transportation, construction, utility, trade, and petroleum refining (gas processing) equipment purchasing sectors. The net population migration out of the county has induced decreases of equipment purchases in the services equipment purchasing sector.
9. Private industry is still investing in Atlantic County New Jersey but to a lesser degree.
10. Induced increases in income are still diminishing within Atlantic County, New Jersey.
11. Increased domestic production within Atlantic County, New Jersey is still rising.
12. Increased State and local government activity continues to rise.
13. Increased Federal government monies are still being spent in Atlantic County, New Jersey as Baltimore Canyon oil and gas production reaches peak levels.

Table 28

ATLANTIC COUNTY NEW JERSEY
Population Statistics

	<u>1980</u> <u>With</u> <u>Development</u>	<u>1980</u> <u>Without</u> <u>Development</u>	<u>1980</u> <u>Difference</u>	<u>1985</u> <u>With</u> <u>Development</u>	<u>1985</u> <u>Without</u> <u>Development</u>	<u>1985</u> <u>Difference</u>	<u>1990</u> <u>With</u> <u>Development</u>	<u>1990</u> <u>Without</u> <u>Development</u>	<u>1990</u> <u>Difference</u>
Population	190,462	180,365	10,097	189,889	184,584	5,305	193,909	190,517	3,392
Population Density (Per Square Mile)	331	314	7	330	321	9	337	331	6
Net Population Migration	12,409	2,314	10,095	-1,804	3,079	-4,883	3,815	5,796	-1,981

Table 29

ATLANTIC COUNTY NEW JERSEY
Labor Statistics

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Civilian Labor Force	77,607	73,430	4,177	79,887	77,749	2,138	84,337	82,947	1,390
Civilian Persons Employed	73,296	68,901	4,395	74,640	72,583	2,057	79,385	78,036	1,349
Civilian Unemployment Rate (Percent)	5.55	6.17	-.62	6.57	6.64	-.07	5.87	5.92	-.05
Net Commuters	7,281	6,839	442	7,455	7,249	206	7,971	7,838	133
Multi-Job Holders	3,423	3,180	243	3,460	3,356	104	3,692	3,692	0
Earnings (Thousands Of Dollars)	673,432	616,237	57,195	709,530	682,052	27,478	789,307	770,529	18,778

Table 30
ATLANTIC COUNTY NEW JERSEY
Induced Job Effects
By Sector

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Construction	7,731	4,211	3,520	5,427	4,406	1,021	4,975	4,678	297
Retail Stores	18,184	17,504	680	18,806	18,509	297	20,070	19,919	151
Wholesale Trade	3,128	2,855	273	3,251	3,128	123	3,557	3,492	65
Petroleum Mining	202	0	202	357	0	357	417	0	417
Transportation	1,092	966	126	1,220	1,002	218	1,360	1,061	299
Auto Dealers, Service Stations	2,101	1,981	120	2,092	2,040	52	2,174	2,148	26
State And Local Government	11,308	11,201	107	12,068	11,891	177	13,023	12,835	188
Federal Civilian Government	2,888	2,856	32	3,083	3,020	63	3,311	3,240	71

Table 31

ATLANTIC COUNTY NEW JERSEY
Induced Earnings Effects
By Sector
(Thousands of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Construction	98,115	51,272	46,843	71,054	56,627	14,427	67,864	63,413	4,431
Retail Stores	123,845	119,251	4,594	133,787	31,630	2,157	148,929	147,754	1,175
Wholesale Trade	38,304	35,086	3,218	42,098	40,567	1,531	48,560	47,717	843
Petroleum Mining	2,650	0	2,650	4,643	0	4,643	5,375	0	5,375
Transportation	12,695	10,824	1,871	15,275	11,861	3,414	18,215	13,294	4,921
Auto Dealers, Service Stations	14,096	13,270	826	14,560	14,181	379	15,699	15,497	202
State And Local Government	80,123	79,361	762	89,724	88,408	1,316	101,503	100,036	1,467
Federal Civilian Government	42,825	42,347	478	47,980	46,998	982	54,030	52,865	1,165
Medical And Educa- tional Institutions	68,200	68,183	17	95,009	94,758	251	128,559	128,165	394
Electric, Gas Utility	20,084	20,080	4	22,469	22,298	171	25,643	25,130	513
Petroleum Refining	0	0	0	177	0	177	219	0	219
Finance, Insurance Real Estate	35,390	35,392	-2	35,397	25,506	-109	35,434	36,049	-615
Chemicals, Plastics	15,579	15,585	-6	14,293	14,462	-169	13,170	13,382	-212

Table 32

ATLANTIC COUNTY NEW JERSEY
Income And Expenditures Statistics
(Thousands of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1980 With Development	1990 Without Development	1990 Difference
Per Capita Income (Dollars Only)	4,873	4,748	125	5,148	5,107	41	5,588	5,563	25
Personal Income	928,170	856,303	71,867	977,527	942,661	34,866	1,083,571	1,059,818	23,753
State And Local Government Expend- itures And Purchases (Excluding Construc- tion And Employee Compensation)	200,744	198,639	2,105	223,105	219,503	3,602	250,458	246,476	3,982
Construction	317,125	112,009	205,116	200,955	120,739	80,216	153,783	132,398	21,385
Equipment Purchases	113,746	77,652	36,094	146,134	89,798	56,336	108,091	104,843	3,248
Personal Consumption Expenditures	908,994	849,067	59,927	976,953	946,967	49,986	1,097,448	1,077,413	20,035
Private Investment	400,226	159,352	240,854	313,558	177,566	135,992	224,660	200,636	24,024

Table 33

ATLANTIC COUNTY NEW JERSEY
Personal Consumption Expenditures Sectors
(Thousands of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Agriculture, Food	134,484	127,065	7,419	140,914	137,399	3,515	154,006	151,660	2,346
Forestry And Fishery	840	799	41	609	595	14	455	449	6
Non Petroleum Mining	765	745	20	1,018	1,006	12	1,381	1,370	11
Apparel, Textiles	34,436	32,065	2,371	35,862	34,739	1,123	39,128	38,380	748
Lumber, Wood Products	11,410	10,712	698	12,501	12,153	348	14,280	14,040	240
Chemicals, Plastics	23,138	22,153	985	25,387	24,899	488	28,812	28,473	339
Petroleum Refining	17,647	16,781	866	19,294	18,867	427	21,877	21,582	295
Leather Glass, Stone	7,827	7,367	460	8,192	7,975	217	8,951	8,807	144
Iron And Steel	7	7	0	6	6	0	6	6	0
Other Metals	1,598	1,486	112	1,674	1,621	53	1,839	1,803	36
Machines, Miscellaneous, Manufacturing	55,542	52,247	3,295	61,514	59,368	2,146	70,419	68,849	1,570
Transportation	14,433	13,591	842	16,290	15,859	431	19,128	18,819	309
Communication	51,629	50,084	1,545	56,945	56,186	759	64,614	64,091	523
Electric, Gas Utility	38,840	37,563	1,277	42,866	42,231	635	48,759	48,315	444
Water Utility	785	662	123	901	752	149	987	884	103
Wholesale Trade	44,948	42,049	2,899	47,996	46,678	1,318	53,415	52,724	691
Finance, Insurance, Real Estate	160,062	142,620	17,442	171,816	163,097	8,719	196,506	190,377	6,129
Amusement, Services	44,420	42,103	2,317	44,677	43,596	1,081	46,890	46,180	710
Retail Stores	163,352	155,439	7,913	176,917	173,027	3,890	198,129	195,928	2,201
Medical And Educational Institutions	61,051	61,051	6,524	74,617	71,284	3,333	87,210	84,818	2,392
Auto Dealers, Service Stations	31,541	28,800	2,741	33,193	31,923	1,270	36,797	36,061	736

Table 34

ATLANTIC COUNTY NEW JERSEY
Construction By Sectors
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1980 With Development	1990 Without Development	1990 Difference
Residential	44,352	43,957	5	46,680	46,043	537	49,716	49,039	677
Industrial	32,693	2,519	30,174	32,609	2,419	32,190	2,384	2,363	21
Oil And Gas Well Drilling	39,248	0	39,248	48,525		48,525	19,505	0	19,505
Electric Utility	12,396	12,392	4	14,693	14,551	142	17,491	17,056	435
Gas And Petroleum Pipelines	134,872	0	134,872	0	0	0	0	0	0
Sewer And Water Systems	8,253	8,182	71	8,994	8,871	123	9,919	9,782	137
Military And Other Public	8,715	8,628	87	9,794	9,642	152	11,147	10,976	171
Highway	2,931	2,867	64	2,929	2,831	98	2,944	2,847	97

Table 35

ATLANTIC COUNTY NEW JERSEY
Other Economic Statistics
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Domestic Output	1,578,564	1,482,938	95,626	2,034,103	1,662,188	371,915	2,536,372	1,894,873	641,499
Gross Regional Product	1,156,515	1,065,874	90,641	1,455,551	1,202,515	253,036	1,790,493	1,377,827	412,666
Total Supply	1,579,908	1,484,267	95,641	2,035,754	1,663,809	371,945	2,538,436	1,896,898	641,538
Total Demand	2,026,567	1,730,141	296,426	2,231,779	1,943,038	288,741	2,508,133	2,222,565	285,568

Table 36

ATLANTIC COUNTY NEW JERSEY
Total Output By Sector
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Petroleum Mining	0	0	0	311,652	0	311,652	611,584	0	611,584
Chemicals, Plastics	60,128	60,173	-45	60,537	61,806	-1,269	60,561	62,259	-1,698
Petroleum Refining	0	0	0	3,520	0	3,520	5,184	0	5,184
Leather, Glass, Stone	104,354	104,296	58	136,742	136,448	294	177,404	176,864	540
Transportation	26,927	22,621	4,306	36,191	27,478	8,713	47,942	34,058	13,884
Communication	80,981	80,945	36	97,870	97,592	278	117,457	117,746	289
Electric, Gas tility	161,872	161,845	27	184,061	182,835	1,216	212,127	208,423	3,704
Wholesale Trade	57,766	50,329	7,437	62,493	58,925	3,568	72,302	70,323	1,979
Finance, Insurance, Real Estate	255,112	255,160	-48	265,679	267,825	-2,146	272,518	284,307	-11,789
Retail Stores	191,583	182,605	8,978	204,100	199,901	4,199	225,304	223,027	2,277
Medican And Educa- tional Institutions	135,361	135,326	35	185,614	185,117	497	247,160	246,393	6,202
Auto Dealers, Service Stations	39,016	36,767	2,249	39,351	38,302	1,049	41,526	40,958	568
Construction	138,761	66,195	72,566	111,903	71,591	40,312	93,420	78,564	14,856

Table 37

ATLANTIC COUNTY NEW JERSEY
Value Added By Sector
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Petroleum Mining	0	0	0	198,699	0	198,699	389,926	0	389,926
Chemicals, Plastics	27,738	27,756	-18	27,862	28,385	-523	27,862	28,562	-700
Petroleum Refining	0	0	0	771	0	771	1,136	0	1,136
Transportation	16,949	14,239	2,710	22,781	17,296	5,585	30,178	21,439	8,739
Electric, Gas Utility	80,722	80,704	18	93,953	93,208	745	110,585	108,296	2,289
Wholesale Trade	43,433	37,841	5,592	46,987	44,305	2,682	54,362	52,874	1,488
Finance, Insurance, Real Estate	192,973	193,012	-39	202,125	203,885	-1,760	207,996	217,663	-9,667
Retail Stores	135,941	129,191	6,750	145,461	142,305	3,156	161,423	159,711	1,712
Medical And Educa- tional Institutions	93,368	93,344	24	128,030	127,687	343	170,483	169,954	529
Auto Dealers, Service Stations	26,362	24,671	1,691	26,786	25,997	789	28,540	28,113	427
Construction	132,838	60,347	72,491	104,840	65,059	39,781	85,116	71,154	13,962
Federal Civilian Government	43,722	43,234	488	48,984	47,982	1,002	55,161	53,972	1,189

Table 38

ATLANTIC COUNTY NEW JERSEY
Total Supply By Sector
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Petroleum Mining	0	0	0	311,652	0	311,652	611,584	0	611,584
Chemicals, Plastics	60,128	60,173	-45	69,537	61,806	-1,269	60,561	62,259	-1,698
Petroleum Refining	0	0	0	3,520	0	3,520	5,184	0	5,184
Leather, Glass, Stone	104,364	104,306	58	136,757	136,462	295	177,424	176,884	540
Transportation	26,927	22,621	4,306	36,191	27,478	8,713	47,942	34,058	13,884
Communication	81,179	81,141	38	98,148	97,865	283	117,846	118,127	-281
Electric, Gas Utility	162,171	162,142	29	184,482	183,248	1,234	212,717	209,000	3,717
Wholesale Trade	57,766	50,329	7,437	62,493	58,925	3,568	72,302	70,323	1,979
Finance, Insurance, Real Estate	255,112	255,160	-48	265,679	267,825	-2,146	272,518	284,307	-11,789
Retail Stores	191,583	182,605	8,978	204,100	199,901	4,199	225,304	223,027	2,277
Medical And Educa- tional Institutions	135,361	135,326	35	185,614	185,117	497	247,160	246,393	767
Auto Dealers, Service Stations	39,016	36,767	2,249	39,351	38,302	1,049	41,526	40,958	568
Construction	138,761	66,195	72,566	111,903	71,591	40,312	93,420	78,564	14,856

Table 39

ATLANTIC COUNTY NEW JERSEY
Total Demand By Sector
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Agriculture, Food	168,797	161,191	7,606	179,832	176,153	3,679	198,766	196,276	2,490
Forestry And Fishery	2,240	2,204	36	1,869	1,858	11	1,724	1,718	6
Non Petroleum Mining	12,747	11,738	989	15,020	14,481	539	18,112	17,734	378
Petroleum Mining	17,043	17,042	1	22,802	18,180	4,622	27,912	19,651	8,261
Apparel, Textiles	87,594	85,013	2,581	86,089	84,749	1,340	87,408	86,443	965
Lumber, Wood Products	43,868	41,787	2,081	48,206	46,699	1,507	53,862	53,168	694
Chemicals, Plastics	76,336	71,803	4,533	88,882	81,964	6,918	104,229	95,222	9,007
Petroleum Refining	39,347	31,421	7,926	40,399	36,003	4,396	46,809	41,922	4,887
Leather, Glass, Stone	43,262	36,028	7,234	49,499	42,692	6,807	55,283	51,093	4,190
Iron And Steel	39,809	5,878	33,931	12,054	6,103	5,951	9,817	6,486	3,331
Other Metals	66,356	35,705	30,651	50,074	39,750	10,324	47,845	44,825	3,020
Machinery Miscellaneous, Manufacturing	205,308	167,036	38,272	246,023	188,633	57,390	237,132	216,883	20,249
Transportation	57,466	48,657	8,809	64,649	58,667	5,982	76,117	71,559	4,558
Communication	88,182	85,773	2,409	101,152	99,386	1,766	119,005	117,223	1,782
Electric, Gas Utility	110,666	108,488	2,178	127,613	121,823	5,790	148,788	138,753	10,035
Water Utility	3,119	2,894	225	3,727	3,354	373	4,426	3,957	469
Wholesale Trade	82,408	70,871	11,537	90,666	82,927	7,739	103,067	98,694	4,373
Finance, Insurance, Real Estate	243,419	223,166	20,253	338,531	251,196	87,335	445,568	288,382	157,186
Amusement, Services	58,082	55,671	2,411	59,031	57,880	1,151	62,277	61,504	773
Retail Stores	313,420	285,579	27,841	349,840	324,698	25,142	398,771	374,376	24,395
Medical And Educational Institutions	85,269	78,205	7,064	95,679	91,272	4,407	112,452	108,428	4,024
Auto Dealers, Service Stations	47,483	42,172	5,311	52,726	47,445	5,281	59,954	54,299	5,655
Construction	134,347	61,798	72,549	107,416	67,128	40,288	88,811	73,970	14,841

Table 40

SUMMARY OF INDUCED EFFECTS
CAPE MAY COUNTY, NEW JERSEY
(Percent Change)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Population	+ 5.85	+ 10.08	+ 2.61
Population Density	+ 5.76	+ 9.96	+ 2.68
Net Population Migration	+111.77	+ 32.41	- 45.61
Civilian Labor Force	+ 7.32	+ 13.96	+ 6.28
Civilian Persons Employed	+ 7.07	+ 14.36	+ 7.58
Civilian Unemployment Rate	- .40	- 1.09	- 10.11
Earnings	+ 8.21	+ 16.11	+ 8.54
Personal Income	+ 7.21	+ 13.93	+ 7.25
Property Income	+ 6.59	+ 13.07	+ 6.85
Per Capita Income	+ 1.28	+ 3.56	+ 4.26
State and Local Governemnt Expend- itures and Purchases (Excluding Construction and Employee Compen- sation)	+ 1.68	+ 5.27	+ 4.57
Personal Consumption Expenditures	+ 7.48	+ 14.38	+ 7.26
Private Investment	+177.31	+204.11	+ 59.15
Construction	+121.11	+157.92	+ 32.15
Equipment Purchases	+191.93	+187.80	+ 84.71
Gross Regional Product	+ 14.60	+ 90.41	+130.53
Domestic Output	+ 13.06	+113.52	+175.33
Total Supply	+ 13.04	+113.32	+175.22
Total Demand	+ 27.01	+ 58.52	+ 50.65

Local Summary -- Cape May County, New Jersey

Cape May County, New Jersey 1980

1. A significant number of persons have been attracted to Cape May County, New Jersey by increased economic opportunity.
2. Increased economic opportunity has been induced in the construction, retail stores, wholesale trade, transportation, auto dealers and service station sectors.
3. Baltimore Canyon activity has caused new economic activity to occur in the machines, and miscellaneous manufacturing sectors within Cape May County, New Jersey.
4. The greatest construction sector increases have been induced in the oil and gas well drilling and industrial construction sectors.
5. Induced increases of infrastructure construction are minimal. The influx of persons within Cape May County, New Jersey has not stimulated great expansion of construction activity in the residential offices, stores, highway, sewer and water systems, conservation, and public construction sectors.

6. Only the oil and gas well and construction equipment purchasing sectors are induced to purchase a significant amount of Baltimore Canyon related equipment.
7. Resources are being drawn to Cape May County, New Jersey from within and outside the Middle Atlantic Coastal region.
8. Private industry invests heavily in Cape May County, New Jersey to support Baltimore Canyon activity.
9. An induced increase of income occurs in Cape May County, New Jersey.
10. Induced Baltimore Canyon State and local government activity increases.
11. An induced increase of Federal monies are spent in Cape May County, New Jersey.

Cape May County, New Jersey 1985

1. An even greater increase in population occurs in Cape May County, New Jersey.
2. Increased economic activity occurs in the petroleum mining, construction, retail stores, wholesale trade and transportation sectors.

3. Economic activity in the newly created machines, miscellaneous manufacturing, and petroleum refining (gas processing) sectors is expanding due to Baltimore Canyon activity.
4. Resources are drawn from the finance, insurance, real estate, and communication sectors to support increased economic activity in other sectors in Cape May County, New Jersey.
5. Construction increases are greatest in the industrial and oil and gas well drilling construction sectors.
6. Infrastructure construction has risen significantly to support the increased population in Cape May County, New Jersey. Residential, highway, sewer and water systems, offices, stores, public residential, public educational, and other public construction sectors experience an increase in economic activity.
7. An increase in equipment purchases occurs in the oil and gas well, construction, transportation, and trade equipment purchasing sectors.
8. Resources are still being drawn to Cape May County, New Jersey.

10. An even greater increase in induced income occurs in Cape May County, New Jersey suggesting that increased economic opportunity is still expanding.
11. State and local government activity is being expanded to a greater amount by Baltimore Canyon activity.
12. A greater amount of Federal monies are spent in Cape May County, New Jersey to support Baltimore Canyon activity.

Cape May County, New Jersey 1990

1. Population is still greater than without development but persons are migrating out of Cape May County, New Jersey.
2. Increased economic activity occurs in the petroleum mining, construction, transportation, retail stores, wholesale trade, auto dealers, and service station sectors.
3. Economic activity in the machines, miscellaneous manufacturing, and petroleum refining (gas processing) sectors continues to expand.
4. The electric and gas utility sectors experience an increase in economic activity due to the greater

availability of gas within Cape May County, New Jersey.

5. An induced increase of construction activity continues in the oil and gas well drilling construction sector.
6. Infrastructure construction was not great enough to cause problems of over extension as population leaves the county. Not all the population entering a given area can be expected to remain permanently. Planning is required to avoid an excess of construction activity. Infrastructure construction should be geared to the knowledge that only a portion of the population increase due to Baltimore Canyon activity will remain over time.
7. Equipment is still being purchased by the oil and gas wells, transportation, construction, and trade sectors.
8. Resources are still being drawn to Cape May County, New Jersey but to a lesser degree.
9. Private industry is investing a lesser amount in Cape May County, New Jersey to support Baltimore Canyon activity.

10. Induced income increases continue to occur in Cape May County, New Jersey although increased economic opportunity seems to be diminishing.
11. Increased State and local government activity is being expanded but to a lesser degree by Baltimore Canyon activity.
12. An even greater amount of Federal monies are spent in Cape May County, New Jersey to support Baltimore Canyon activity.

Population

Population Density
(Per Square Mile)

Net Population
Migration

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6

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Table 41

CAPE MAY COUNTY NEW JERSEY
Population Statistics

	<u>1980 With Development</u>	<u>1980 Without Development</u>	<u>1980 Difference</u>	<u>1985 With Development</u>	<u>1985 Without Development</u>	<u>1985 Difference</u>	<u>1990 With Development</u>	<u>1990 Without Development</u>	<u>1990 Difference</u>
Population	68,698	64,911	3,787	79,615	72,362	7,252	81,635	79,560	2,076
Population Density (Per Square Mile)	257	243	14	298	271	27	306	298	8
Net Population Migration	7,149	3,357	3,791	14,301	10,798	3,502	6,171	11,378	-5,207

Table 42

CAPE MAY COUNTY NEW JERSEY
Labor Statistics

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Civilian Labor Force	21,928	20,459	1,469	25,289	22,162	3,127	25,336	23,869	1,467
Civilian Persons Employed	19,764	18,431	1,333	22,328	19,538	2,790	22,702	21,106	1,595
Civilian Unemployment Rate	9.87	9.92	-.04	11.71	11.84	-.13	10.40	11.57	-1.18
Net Commuters	-595	-595	0	-679	-679	0	-774	-773	-1
Multi-Job Holders	3,718	653	64	817	689	128	812	744	67
Earnings (Thousands Of Dollars)	218,776	202,145	16,630	262,333	225,870	36,463	278,576	256,723	21,853

Table 43

CAPE MAY COUNTY NEW JERSEY
Induced Job Effects
By Sector

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Petroleum Mining	0	0	0	310	0	310	417	0	417
Machine Miscellaneous	45	0	45	52	0	52	70	0	70
Transportation	366	332	34	604	349	256	682	375	307
Communication	903	903	0	1,012	1,024	-12	1,111	1,162	-51
Wholesale Trade	741	664	78	890	739	151	925	839	86
Finance, Insurance, Real Estate	1,419	1,419	-1	1,667	1,687	-21	1,937	2,006	-70
Retail Stores	3,877	3,679	197	4,285	3,925	360	4,438	4,263	175
Auto Dealers, Service Stations	797	760	37	900	827	74	977	909	68
Construction	2,615	1,708	906	3,138	1,756	1,382	2,141	1,833	309
Federal Civilian Government	383	365	18	487	414	73	537	469	68
State And Local Government	4,808	4,735	73	5,310	5,064	246	5,728	5,497	231
Domestic Services	487	478	9	491	463	28	479	455	24

Table 44

CAPE MAY COUNTY NEW JERSEY
Induced Earnings Effects
By Sectors
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1980 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Petroleum Mining	0	0	0	4,078	0	4,078	5,436	0	5,436
Petroleum Refining	0	0	0	165	0	165	204	0	204
Other Metals	4,433	4,430	3	5,078	4,961	117	5,795	5,636	159
Machines, Miscellaneous, Manufacturing	560	0	560	709	0	709	999	0	999
Transportation	2,976	2,470	506	6,327	2,796	3,532	8,294	3,236	5,058
Communication	9,514	9,512	2	11,446	11,585	-138	13,386	14,048	-662
Electric, Gas Utility	4,155	4,155	0	4,126	4,096	30	4,337	4,117	220
Wholesale Trade	8,253	7,340	913	10,511	8,638	1,873	11,480	10,350	1,130
Finance, Insurance, Real Estate	13,545	13,552	-7	17,203	17,464	-261	21,402	22,317	-915
Retail Stores	32,322	30,986	1,336	37,329	34,699	2,630	40,880	39,509	1,371
Auto Dealers, Service Stations	6,872	6,618	254	8,191	7,611	579	9,502	8,831	671
Construction	33,697	21,624	12,073	42,888	23,441	19,446	30,390	25,781	4,609
Federal Civilian Government	6,085	5,800	286	8,118	6,897	1,222	9,385	8,197	1,188
State And Local Government	44,737	44,058	679	51,844	49,441	2,403	58,630	56,264	2,366

Table 45

CAPE MAY COUNTY NEW JERSEY
Income And Expenditure Statistics
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Per Capita Income (Dollars Only)	4,589	4,530	58	4,718	4,555	162	4,919	4,719	201
Personal Income	315,225	294,075	21,150	375,593	329,645	45,949	401,605	375,405	26,199
State And Local Government Expend- itures And Purchases (Excluding Construc- tion And Employee Compensation)	96,850	95,247	1,602	111,830	106,199	5,631	125,607	120,106	5,502
Construction	127,816	57,830	69,985	156,346	60,614	95,732	85,524	64,722	20,802
Equipment Purchases	54,315	18,629	35,686	58,936	20,469	38,467	43,303	22,927	20,375
Personal Consumption Expenditures	254,194	236,509	17,685	307,936	269,216	38,721	333,690	311,051	22,639
Private Investment	164,952	59,495	105,457	192,137	63,151	128,987	108,740	68,306	40,434

Table 46

CAPE MAY COUNTY NEW JERSEY
Personal Consumption Expenditures By Sector
(Thousands of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Agriculture, Food	34,146	31,964	2,182	39,871	35,206	4,664	41,986	39,375	2,612
Forestry And Fishery	197	185	12	158	140	18	114	107	7
Non Petroleum Mining	76	70	6	113	96	16	145	134	11
Apparel, Textiles	6,882	6,184	698	8,421	6,931	1,490	8,688	7,856	833
Lumber, Wood Products	3,550	3,343	207	4,291	3,831	459	4,716	4,449	267
Chemicals, Plastics	7,869	7,579	289	9,233	8,586	647	10,241	9,863	378
Petroleum Refining	4,910	4,655	255	5,879	5,313	567	6,471	6,142	329
Leather, Glass, Stone	1,912	1,777	135	2,243	1,955	288	2,342	2,181	161
Other Metals	1,104	1,071	33	1,257	1,186	71	1,372	1,332	40
Machines, Miscellaneous, Manufacturing	15,810	14,808	1,002	20,097	17,330	2,767	22,324	20,579	1,746
Transportation	4,363	4,155	248	5,452	4,881	571	6,201	5,857	344
Communication	19,187	18,733	454	22,181	21,174	1,008	24,861	24,278	583
Electric, Gas Utility	9,111	8,805	306	11,062	10,278	784	12,643	12,148	495
Water Utility	279	237	41	433	296	136	482	368	114
Wholesale Trade	11,579	10,756	823	13,689	12,067	1,622	14,715	13,776	940
Finance, Insurance Real Estate	43,238	38,107	5,130	56,737	45,168	11,569	60,850	54,033	6,818
Amusement, Services	23,228	22,547	681	25,872	24,438	1,433	27,738	26,947	790
Retail Stores	38,905	36,564	2,341	45,625	41,129	4,496	49,646	47,058	2,583
Medical And Educational Institutions	15,371	13,452	1,919	20,762	16,340	4,422	22,661	20,000	2,661
Auto Dealers, Service Stations	11,093	10,197	896	13,095	11,487	1,608	13,990	13,141	849

Table 47

CAPE MAY COUNTY NEW JERSEY
Construction By Sectors
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Residential	32,653	32,385	268	43,118	34,397	8,721	37,965	37,133	832
Offices, Stores, Etc.	2,362	2,301	62	2,736	2,358	378	2,976	2,488	488
Industrial	30,998	809	30,189	33,629	767	32,862	785	738	47
Oil And Gas Well Drilling	39,248	0	39,248	48,525	0	48,525	18,554	0	18,554
Highway	8,415	8,371	44	10,520	8,254	2,266	8,386	8,268	119
Sewer And Water Systems	907	858	49	1,349	969	380	1,277	1,109	168
Conservation	3,298	3,277	21	4,903	3,840	1,063	4,639	4,559	80
Public Residential	1,403	1,392	10	1,915	1,468	447	1,642	1,573	69
Public Educational	1,111	1,080	31	1,510	1,154	355	1,347	1,252	95
Military And Other Public	1,987	1,928	59	2,885	2,199	686	2,752	2,543	210

Table 48

CAPE MAY COUNTY NEW JERSEY
Other Economic Statistics
(Thousands Of Dollars)

	<u>1980 With Development</u>	<u>1980 Without Development</u>	<u>1980 Difference</u>	<u>1985 With Development</u>	<u>1985 Without Development</u>	<u>1985 Difference</u>	<u>1990 With Development</u>	<u>1990 Without Development</u>	<u>1990 Difference</u>
Domestic Output	360,085	318,508	41,577	723,107	338,555	384,452	1,018,965	370,090	648,875
Gross Regional Product	313,119	273,235	39,884	557,691	292,878	264,813	741,460	321,638	419,822
Total Supply	360,640	319,053	41,586	723,812		384,490	1,019,842	370,925	648,917
Total Demand	576,047	453,562	122,485	807,837	509,909	297,929	890,497	584,441	360,055

Table 49

CAPE MAY COUNTY NEW JERSEY
Total Output By Sector
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Petroleum Mining	0	0	0	311,652	0	311,652	605,723	0	605,723
Petroleum Refining	0	0	0	3,251	0	3,251	4,789	0	4,789
Other Metals	11,354	11,347	7	13,141	12,786	354	15,095	14,618	477
Machines, Miscellaneous, Manufacturing	1,929	0	1,929	2,691	0	2,691	3,790	0	3,790
Transportation	7,105	5,941	1,165	16,679	7,436	9,243	23,748	9,489	14,260
Communication	30,917	30,910	6	37,692	38,144	-452	44,923	47,028	-2,105
Electric, Gas Utility	21,944	21,944	0	21,433	21,245	187	22,281	20,893	1,388
Wholesale Trade	12,595	10,484	2,111	17,006	12,629	4,376	18,186	15,519	2,667
Finance, Insurance, Real Estate	72,276	72,289	-13	76,889	77,365	-476	82,914	84,554	-1,639
Retail Stores	45,694	17,149	2,592	53,282	48,155	5,126	57,489	54,818	2,671
Auto Dealers, Service Stations	14,785	14,001	785	18,208	16,459	1,749	21,762	19,391	2,371
Construction	58,538	25,465	33,073	73,685	26,937	46,748	43,525	28,934	14,591

CAPE MAY COUNTY NEW JERSEY
Value Added By Sector
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Petroleum Mining	0	0	0	198,699	0	198,699	386,190	0	386,190
Petroleum Refining	0	0	0	712	0	712	1,049	0	1,049
Other Metals	5,550	5,546	3	6,419	6,250	169	7,373	7,145	228
Machines, Miscellaneous, Manufacturing	1,009	0	1,009	1,408	0	1,408	1,983	0	1,983
Transportation	4,472	3,739	733	10,499	4,681	5,818	14,949	5,973	8,976
Communication	22,117	22,112	5	26,442	26,802	-360	30,877	32,541	1,664
Electric, Gas Utility	15,273	15,273	0	14,917	14,786	130	15,507	14,541	966
Wholesale Trade	9,470	7,882	1,587	12,786	9,496	3,291	13,674	11,668	2,006
Finance, Insurance, Real Estate	51,964	51,953	-6	53,611	53,854	-242	56,185	57,020	-835
Retail Stores	33,119	31,170	1,949	38,840	34,986	3,854	42,007	39,999	2,008
Auto Dealers, Service Stations	10,368	9,841	526	12,756	11,518	1,238	15,040	13,540	1,500
Construction	56,787	23,764	33,023	71,213	25,056	46,157	40,433	26,816	12,617
Federal Civilian Government	6,213	5,921	292	8,288	7,041	1,247	9,581	8,369	1,213
State And Local Government	48,525	47,789	736	56,234	53,627	2,607	63,595	61,028	2,566

Table 51

CAPE MAY COUNTY NEW JERSEY
Total Supply By Sector
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Petroleum Mining	0	0	0	311,652	0	311,652	605,723	0	605,723
Petroleum Refining	0	0	0	3,251	0	3,251	4,789	0	4,789
Other Metals	11,354	11,347	7	13,141	12,786	354	15,095	14,618	477
Machines, Miscellaneous, Manufacturing	1,930	1	1,929	2,692	2	2,691	3,792	2	3,790
Transportations	7,105	5,941	1,165	16,679	7,436	9,243	23,748	9,489	14,260
Communication	30,990	30,982	8	37,800	38,245	-445	45,073	47,171	-2,097
Electric, Gas Utility	22,055	22,053	2	21,595	21,398	197	22,509	21,108	1,401
Wholesale Trade	12,595	10,484	2,111	17,006	12,629	4,376	18,186	15,519	2,667
Finance, Insurance, Real Estate	72,276	72,289	-13	76,889	77,365	-476	82,914	84,554	-1,639
Retail Stores	45,694	43,101	2,592	53,282	48,155	5,126	57,489	54,818	2,671
Auto Dealers, Service Stations	14,705	14,001	705	18,208	16,459	1,749	21,762	19,391	2,371
Construction	58,538	25,465	33,073	73,685	26,937	46,748	43,525	28,934	14,591

Table 52

CAPE MAY COUNTY NEW JERSEY
Total Demand By Sector
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Agriculture, Food	45,082	42,821	2,261	50,605	45,622	4,984	52,495	49,661	2,834
Forestry & Fishery	2,159	2,148	11	1,823	1,808	16	1,680	1,673	7
Non Petroleum Mining	1,921	1,549	371	2,141	1,564	578	1,868	1,611	257
Petroleum Mining	84	83	1	4,266	82	4,184	7,475	82	7,394
Apparel, Textiles	11,891	11,092	799	13,413	11,651	1,763	13,532	12,474	1,058
Lumber, Wood Products	13,354	12,292	1,062	16,609	13,786	2,824	16,591	15,715	876
Chemicals Plastics	16,701	14,252	2,449	24,308	16,508	7,800	29,152	19,547	9,605
Petroleum Refining	11,385	9,589	1,796	15,557	10,661	4,896	17,633	12,132	4,901
Leather, Glass Stone	12,100	7,466	4,635	16,222	7,988	8,234	12,865	8,670	4,195
Iron and Steel	7,739	2,962	4,777	9,671	3,027	6,644	6,927	3,145	3,782
Other Metals	20,168	12,279	7,888	23,463	12,535	10,928	17,349	13,081	4,268
Machines, Miscella- neous Mfg.	74,201	41,497	32,704	92,801	47,032	45,769	88,577	54,541	34,035
Transportation	15,684	12,522	3,162	21,142	14,766	6,376	22,665	17,725	4,940
Communication	29,836	29,059	777	36,654	34,547	2,107	43,363	41,605	1,758
Electric, Gas Utility	18,108	17,461	647	25,435	19,587	5,848	31,896	22,354	9,541
Water Utility	745	666	79	1,132	762	370	1,358	884	474
Wholesale Trade	18,029	13,993	4,036	24,443	16,642	7,801	25,575	20,179	5,396
Finance, Insurance, Real Estate	64,806	58,643	6,163	158,814	68,077	90,737	237,716	80,025	157,690
Amusement, Services	26,527	25,814	713	30,079	28,550	1,529	32,971	32,127	844
Retail Stores	82,148	71,718	10,430	107,397	81,419	25,977	120,754	94,029	26,726
Medical & Education- al Institutions	20,009	17,861	2,147	27,006	21,455	5,551	30,260	26,023	4,237
Auto Dealers, Service Stations	19,195	16,700	2,496	25,038	18,766	6,262	28,105	21,455	6,650
Construction	64,175	31,094	33,081	79,816	33,064	46,752	50,291	35,704	14,586

Table 53

SUMMARY OF INDUCED EFFECTS
MONMOUTH COUNTY, NEW JERSEY
(Percent Changes)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Population	+ .40	+ .83	+ .57
Population Density	+ .36	+ .84	+ .55
Net Population Migration	+ 9.43	+11.26	- 4.73
Civilian Labor Force	+ .40	+ .83	+ .58
Civilian Persons Employed	+ .42	+ 1.07	+ .77
Civilian Unemployment Rate	- .38	- 4.08	- 3.63
Earnings	+ .42	+ 1.28	+ .89
Personal Income	+ .44	+ 1.22	+ .83
Property Income	+ .36	+ 1.01	+ .70
Per Capita Income	+ .06	+ .36	+ .25
State and Local Government Expenditures and Purchases (Excluding Construction and Employee Compensation)	+ .37	+ .69	+ .76
Personal Consumption Expenditures	+ .47	+ 1.21	+ .81
Private Investment	+21.21	+23.91	+ 7.29
Construction	+11.62	+21.28	+ 5.00
Equipment Purchases	+31.92	+19.60	+ 8.81
Gross Regional Product	+ 1.22	+ 8.75	+12.03
Domestic Output	+ .91	+ 9.50	+13.81
Total Supply	+ .94	+ 9.64	+13.74
Total Demand	+ 2.35	+ 5.27	+ 4.92

Local Summary -- Monmouth County, New Jersey

Monmouth County, New Jersey 1980

1. In absolute terms the number of persons entering into Monmouth County, New Jersey to support Baltimore Canyon activity is significant. In comparison to the number of persons already existing in the county, however, the influx of persons is small.
2. Increased economic activity is induced in the construction, retail store, wholesale trade, transportation, machines, and miscellaneous manufacturing sectors to support Baltimore Canyon activity.
3. An induced increase in oil and gas well drilling construction occurs in Monmouth County, New Jersey.
4. Induced increases of infrastructure construction are minimal. The influx of persons into Monmouth County, New Jersey has not stimulated great expansion of construction activity in the residential, offices, stores, highway, sewer and water systems, conservation, and public construction sectors.
5. Induced increases of equipment purchases have occurred in the oil and gas well, and construction equipment purchasing sectors.

6. Resources are being drawn to Monmouth County, New Jersey from within the Mid-Atlantic coastal region and outside the region.
7. Private industry is investing heavily in Monmouth County, New Jersey to support Baltimore Canyon activity.
8. An induced increase of income occurs in Monmouth County, New Jersey.
9. State and local government activity is stimulated.
10. An induced increase of Federal monies is spent in Monmouth County, New Jersey.
11. In terms of the existing level of economic activity, only the changes induced in private investment, construction, equipment purchases, and net population migration can be considered significant.

Monmouth County, New Jersey 1985

1. The number of persons migrating into Monmouth County, New Jersey increases as population increases rise even further.
2. Increased economic activity has been induced in the petroleum mining, petroleum refining (gas processing),

machines, miscellaneous manufacturing, transportation, wholesale trade, retail stores, auto dealers, service station, and construction sectors.

3. Resources are drawn from the chemicals, plastics, finance, insurance, and real estate sectors to other sectors within the county. The demand for products of the chemicals and plastics sectors is met by increased activity in other areas holding a comparative advantage to Monmouth County, New Jersey.
4. Induced increases of construction in the oil and gas well drilling and industrial construction sectors occur.
5. Infrastructure construction has increased in the residential, offices, stores, highway, sewer and water systems, and public construction sectors.
6. Induced increases of equipment purchases occur in the oil and gas wells, construction, transportation and trade equipment purchasing sectors.
7. Resources are being drawn to Monmouth County, New Jersey.
8. Private industry is investing an even greater amount to support Baltimore Canyon activity.

9. Induced increases of income are even greater in Monmouth County, New Jersey.
10. State and local government activity is stimulated to a greater amount.
11. An even greater induced increase of Federal monies is spent in Monmouth County, New Jersey.
12. In terms of the level of activity without development the changes induced within Monmouth County by Baltimore Canyon activity are increasing in significance.

Monmouth County, New Jersey 1990

1. The population level is greater than without development but persons are migrating out of Monmouth County, New Jersey.
2. Increased economic activity continues to be induced in the same sectors.
3. Increased economic activity continues to be induced in the oil and gas well drilling construction sector.
4. Induced increases in infrastructure construction continues to rise slowly and steadily.

5. Induced increases of equipment purchases occur in the same sectors as well as the utility equipment purchasing sector.
6. The electric and gas utility sectors experience an increase in economic activity due to the greater availability of gas within Monmouth County, New Jersey.
7. Resources are being drawn to Monmouth County, New Jersey but at lower levels.
8. Private industry is still investing in Monmouth County, New Jersey but to a lesser degree.
9. Induced increases of income are smaller suggesting that increased economic opportunity is not as great as previous levels.
10. State and local government is still increasing to support Baltimore Canyon activity.
11. Induced increases of Federal monies being spent in Monmouth County, New Jersey is still rising.
12. In terms of the level of activity without development, the county's level of production continues to grow significantly.

D
Population

Population Density
(Per Square Mile)

Net Population
Migration

Table 54

MONMOUTH COUNTY NEW JERSEY
Population Statistics

	<u>1980</u> <u>With</u> <u>Development</u>	<u>1980</u> <u>Without</u> <u>Development</u>	<u>1980</u> <u>Difference</u>	<u>1985</u> <u>With</u> <u>Development</u>	<u>1985</u> <u>Without</u> <u>Development</u>	<u>1985</u> <u>Difference</u>	<u>1990</u> <u>With</u> <u>Development</u>	<u>1990</u> <u>Without</u> <u>Development</u>	<u>1990</u> <u>Difference</u>
Population	531,693	529,679	2,014	572,660	567,992	4,668	614,627	611,107	3,520
Population Density (per Square Mile)	1,115	1,110	4	1,201	1,191	10	1,289	1,281	7
Net Population Migration	23,219	21,213	2,005	24,662	22,210	2,452	26,265	27,547	-1,282

Table 55

MONMOUTH COUNTY NEW JERSEY
Labor Statistics

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Civilian Labor Force	202,278	201,485	794	230,196	228,303	1,893	260,484	259,016	1,468
Civilian Persons Employed	191,613	190,817	795	217,762	215,452	2,311	248,040	246,168	1,872
Civilian Unemployment Rate (Percent)	5.27	5.29	-.02	5.40	5.63	-.23	4.78	4.96	-.18
Net Commuters	-16,535	-16,534	-1	-18,871	-18,869	-2	-21,489	-21,482	-7
Multi-Job Holders	7,147	7,113	34	8,191	8,089	103	9,422	9,346	76
Earnings (Thousands Of Dollars)	2,016,153	2,006,604	9,549	2,392,786	2,362,586	30,199	2,843,037	2,817,877	25,160

Table 56
MONMOUTH COUNTY NEW JERSEY
Induced Job Effects
By Sector

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Petroleum Mining	0	0	0	221	0	221	417	0	417
Machines, Miscellaneous, Manufacturing	11,047	11,023	24	11,394	11,362	33	12,125	12,063	62
Transportation	3,822	3,795	27	4,534	4,311	223	5,242	4,937	306
Wholesale Trade	5,805	5,752	53	7,246	7,113	133	8,898	8,816	81
Retail Sales	38,287	38,153	134	43,615	43,297	318	49,992	49,821	171
Medical And Educational Institutions	20,029	20,027	2	25,254	25,227	27	31,635	31,582	52
Auto Dealers, Service Stations	6,556	6,532	24	,515	7,443	71	8,629	8,553	76
Construction	8,562	8,136	426	9,808	8,784	1,024	9,946	9,631	315
Federal Civilian Government	12,447	12,419	28	13,480	13,374	106	14,742	14,594	147
State And Local Government	24,371	24,278	92	27,265	27,073	192	30,850	30,616	234

Table 57

MONMOUTH COUNTY NEW JERSEY
Induced Earnings Effects
By Sector

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Petroleum Mining	0	0	0	2,907	0	2,907	5,436	0	5,436
Petroleum Refining	0	0	0	176	0	176	218	0	218
Other Metals	16,893	16,879	15	20,185	20,081	104	24,399	24,191	208
Machines, Miscellaneous, Manufacturing	105,331	105,033	298	114,848	114,411	436	129,574	128,717	857
Transportation	45,862	45,464	398	59,145	55,666	3,478	73,440	68,412	5,028
Electric, Gas Utility	19,374	19,371	3	20,802	20,701	101	23,426	23,045	381
Wholesale Trade	66,169	65,542	627	87,524	85,877	1,647	113,590	112,528	1,062
Finance, Insurance, Real Estate	75,043	75,046	-3	88,339	88,455	-116	105,224	105,568	-344
Retail Stores	339,395	338,481	914	409,252	406,965	2,287	497,078	495,903	1,175
Medical And Educational Institutions	192,156	192,141	15	252,147	251,909	238	329,324	328,835	489
Auto Dealers, Service Stations	52,567	52,397	170	63,620	63,044	576	77,092	76,340	751
Construction	135,453	129,600	24,893	161,329	146,707	39,877	173,345	168,570	13,762
Federal Civilain Government	192,488	192,061	436	218,762	217,041	1,757	250,870	248,367	2,556
State And Local Government	198,553	197,801	815	233,088	231,449	1,778	276,480	274,382	2,276

Table 58

MONMOUTH COUNTY NEW JERSEY
Induced Income And Expenditures Effects
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Per Capita Income (Dollars Only)	5,060	5,056	3	5,523	5,503	20	6,071	6,056	15
Personal Income	2,690,143	2,678,190	11,953	3,162,864	3,125,769	37,095	3,731,659	3,700,902	30,757
State And Local Government Expend- itures and Purchases (Excluding Construc- tion And Employee Compensation)	510,723	508,812	1,911	594,152	590,019	4,134	698,686	693,437	5,248
Construction	384,273	344,314	39,959	458,805	378,315	80,490	444,798	423,631	21,167
Equipment Purchases	223,960	169,792	54,168	239,201	199,973	39,229	261,854	240,614	21,240
Personal Consump- tion Expenditures	2,177,455	2,167,303	10,152	2,615,081	2,583,703	31,377	3,148,268	3,122,989	25,280
Private Investment	536,126	442,287	93,839	616,043	496,924	119,119	612,081	570,432	41,649

Table 59

MONMOUTH COUNTY NEW JERSEY
Induced Personal Consumption Expenditures Effects
By Sector
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Agriculture, Food	347,310	346,137	1,173	396,027	392,367	3,660	454,842	451,875	2,967
Forestry And Fishery	1,982	1,975	6	1,555	1,541	14	1,219	1,211	8
Non Petroleum Mining	1,050	1,047	3	1,489	1,477	13	2,108	2,095	13
Apparel, Textiles	88,453	88,078	375	102,503	101,334	1,169	119,012	118,065	947
Lumber, Wood Products	24,987	24,877	111	30,006	29,649	357	36,061	35,762	299
Chemicals, Plastics	66,489	66,334	155	77,602	77,094	508	91,341	90,911	429
Petroleum Refining	38,829	38,692	137	46,187	45,742	445	55,130	54,755	374
Leather, Glass, Stone	19,867	19,795	73	22,711	22,485	226	26,091	25,908	183
Other Metals	8,009	7,991	18	9,092	9,037	56	10,418	10,372	45
Machines, Miscella- neous, Manufacturing	139,946	139,290	656	173,106	170,872	2,235	215,079	213,091	1,988
Transportation	36,602	36,469	133	45,248	44,800	448	56,057	55,666	391
Communication	96,577	96,333	244	112,865	112,075	790	132,867	132,214	662
Electric, Gas Utility	59,149	58,947	202	70,682	70,020	662	84,876	84,313	563
Water Utility	8,876	8,828	48	10,842	10,637	155	13,197	13,067	130
Wholesale Trade	74,783	74,224	559	92,568	91,161	1,408	113,472	112,617	856
Finance, Insurance, Real Estate	278,565	275,796	2,769	370,485	361,402	9,083	480,380	472,612	7,768
Amusement, Services	164,307	163,943	364	182,912	181,788	1,124	205,912	205,017	895
Retail Stores	447,096	445,532	1,564	528,242	524,097	4,145	627,968	625,229	2,735
Medical And Educa- tional Institutions	157,147	156,113	1,035	203,161	199,689	3,472	260,041	257,011	3,030
Auto Dealers, Service Stations	104,811	104,316	495	124,622	123,277	1,345	148,249	147,328	921

Table 60

MONMOUTH COUNTY NEW JERSEY
Construction By Sector
(Thousands Of Dollars)

	<u>1980 With Development</u>	<u>1980 Without Development</u>	<u>1980 Difference</u>	<u>1985 With Development</u>	<u>1985 Without Development</u>	<u>1985 Difference</u>	<u>1990 With Development</u>	<u>1990 Without Development</u>	<u>1990 Difference</u>
Residential	165,917	165,577	340	181,730	181,047	683	201,997	201,141	856
Offices, Stores, Etc.	29,111	29,043	67	32,137	31,828	310	36,054	25,570	484
Industrial	27,522	27,516	6	56,846	26,640	30,207	26,314	26,267	47
Oil And Gas Well Drilling	39,248	0	39,248	48,525	0	48,525	18,554	0	18,554
Highway	12,709	12,654	55	13,289	13,185	104	14,052	13,931	120
Electric Utility	14,169	14,166	3	16,110	16,013	96	18,898	18,540	357
Sewer And Water Systems	6,568	6,506	62	8,188	8,054	133	10,204	10,034	170
Military And Other Public	30,678	30,603	75	36,280	34,975	163	40,891	40,678	212

Table 61

MONMOUTH COUNTY NEW JERSEY
 Other Economic Statistics
 (Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Domestic Output	3,284,302	3,253,527	30,775	4,291,504	3,913,748	377,755	5,445,865	4,785,932	659,934
Gross Regional Product	2,511,078	2,480,913	30,165	3,206,476	2,948,484	257,992	3,989,047	3,560,695	428,353
Total Supply	3,288,145	3,257,358	30,787	4,296,464	3,918,669	377,794	5,452,377	4,792,382	659,995
Total Demand	4,463,841	4,361,219	102,622	5,500,369	5,225,013	275,356	6,673,170	6,360,189	312,981

Table 62

MONMOUTH COUNTY NEW JERSEY
Induced Output Effects By Sector
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Petroleum Mining	0	0	0	311,652	0	311,652	611,584	0	611,584
Chemicals, Plastics	205,045	205,032	13	262,198	262,418	-221	337,991	338,336	-345
Petroleum Refining	0	0	0	3,482	0	3,482	5,129	0	5,129
Leather, Glas., Stone	129,334	129,294	40	173,112	172,867	245	229,794	229,288	5,061
Other Metals	50,420	50,379	41	62,471	62,166	305	77,614	77,010	603
Machines, Miscella- neous, Manufacturing	309,847	308,838	1,009	360,862	359,270	1,592	432,451	429,409	3,042
Transportation	93,967	93,054	914	136,850	127,947	8,903	189,804	175,562	14,242
Communication	154,025	153,990	34	181,012	180,735	276	217,964	217,537	427
Electric, Gas Utility	135,263	135,245	18	143,429	142,798	631	158,067	155,675	2,392
Wholesale Trade	111,099	109,654	1,445	155,735	151,900	3,834	210,624	208,134	2,490
Finance, Insurance, Real Estate	330,151	330,156	-5	343,797	344,007	-209	365,589	366,200	-611
Amusement, Services	161,812	161,798	15	202,987	202,805	182	250,982	250,856	127
Retail Stores	545,502	543,725	1,777	673,299	668,918	4,380	834,648	832,669	1,979
Medical And Educa- tional Institutions	305,652	305,622	30	304,488	404,017	470	529,460	528,509	951
Auto Dealers Service Stations	129,155	128,681	474	159,844	158,059	1,785	197,054	194,407	2,647
Construction	183,207	158,252	24,956	217,301	176,874	40,428	215,594	200,848	14,747

Table 63

MONMOUTH COUNTY NEW JERSEY
Induced Value Added Effects By Sector
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Petroleum Mining	0	0	0	198,699	0	198,699	389,926	0	389,926
Petroleum Refining	0	0	0	763	0	763	1,124	0	1,124
Leather, Glass, Stone	69,331	69,313	18	93,310	93,204	107	124,454	124,237	217
Other Metals	21,653	21,634	20	26,662	26,514	148	32,983	32,689	294
Machines, Miscella- neous, Manufacturing	145,526	145,001	525	168,933	168,121	811	201,882	200,277	1,545
Transportation	59,149	58,574	575	86,142	80,538	5,604	119,475	110,510	8,965
Communication	114,359	114,331	29	137,875	137,645	231	169,487	169,130	357
Electric, Gas Utility	68,997	68,984	12	75,854	75,415	439	86,861	85,195	1,665
Wholesale Trade	83,532	82,446	1,087	117,093	114,210	2,883	158,363	156,491	1,872
Finance, Insurance, Real Estate	232,507	232,509	-2	236,548	236,654	-106	245,540	245,849	-309
Retail Stores	369,206	367,874	1,332	455,470	452,149	3,321	563,738	562,092	1,646
Medical And Educa- tional Institutions	210,829	210,808	21	279,003	278,678	324	363,734	364,548	656
Auto Dealers, Service Stations	87,136	86,786	350	107,911	106,676	1,235	133,081	131,410	1,671
Construction	171,048	146,155	24,893	202,241	162,364	39,877	196,942	183,180	13,762
Federal Civilian Government	196,517	196,082	436	223,341	221,584	1,757	256,121	253,565	2,556
State And Local Government	215,365	214,549	815	252,824	251,046	1,778	299,890	297,614	2,276

Table 64

MONMOUTH COUNTY NEW JERSEY
Induced Supply Effects By Sector
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Petroleum Mining	0	0	0	311,652	0	311,652	611,584	0	611,584
Chemicals, Plastics	205,045	205,032	13	262,198	262,418	-221	337,991	338,336	-345
Petroleum Refining	0	0	0	3,482	0	3,482	5,129	0	5,129
Leather, Glass, Stone	129,363	129,323	40	173,154	172,909	246	229,856	229,349	507
Other Metals	50,420	50,379	41	62,471	62,166	305	77,614	77,010	603
Machines, Miscella- neous, Manufacturing	309,855	308,846	1,009	360,874	359,282	1,592	432,469	429,426	3,043
Transportation	93,967	93,054	914	136,850	127,947	8,903	189,804	175,562	14,242
Communication	154,579	154,543	36	181,818	181,533	285	219,136	218,694	442
Electric, Gas Utility	136,102	136,082	20	144,651	144,007	644	159,843	157,428	2,415
Wholesale Trade	111,099	109,654	1,445	115,735	151,900	3,834	210,624	208,134	2,490
Finance, Insurance, Real Estate	330,151	330,156	-5	343,797	344,007	-209	365,589	366,200	-611
Retail Stores	545,502	543,725	1,777	673,299	668,918	4,380	834,648	832,669	1,979
Medical And Educa- tional Institutions	305,652	305,622	30	404,488	404,017	470	529,460	528,509	951
Auto Dealers, Service Stations	129,155	128,681	474	159,844	158,059	1,785	197,054	194,407	2,647
Construction	183,207	158,252	30,787	217,301	176,874	377,795	215,594	200,848	659,995

Table 65

MONMOUTH COUNTY NEW JERSEY
Induced Demand Effects By Sector
(Thousands Of Dollars)

	1980 With Development	1980 Without Development	1980 Difference	1985 With Development	1985 Without Development	1985 Difference	1990 With Development	1990 Without Development	1990 Difference
Agriculture, Food	433,036	431,804	1,232	487,259	483,411	3,848	554,693	551,551	3,142
Forestry And Fishery	4,070	4,064	6	4,056	4,043	13	4,555	4,545	10
Non Petroleum Mining	16,599	16,339	260	21,130	20,589	540	26,601	26,185	416
Petroleum Mining	13,547	13,549	-2	17,476	13,000	4,477	20,586	12,671	7,915
Apparel, Textiles	182,121	181,708	413	222,735	221,330	1,405	272,848	271,632	1,216
Lumber, Wood Products	130,500	129,990	510	148,670	147,140	1,530	171,323	170,346	977
Chemicals, Plastics	207,213	206,234	978	265,634	258,366	7,268	338,391	328,606	9,784
Petroleum Refining	74,140	73,022	1,118	93,861	89,419	4,442	115,894	110,851	5,043
Leather, Glass, Stone	79,385	78,417	968	99,028	92,170	6,858	114,226	109,905	4,321
Iron And Steel	27,436	23,172	4,264	31,086	24,904	6,183	31,058	27,429	3,629
Other Metals	125,513	122,004	3,510	148,879	139,421	9,458	166,843	162,383	4,460
Machines, Miscella- neous, Manufacturing	531,895	488,206	43,690	626,402	581,443	44,959	743,206	708,133	35,073
Transportation	131,592	129,579	2,013	170,822	165,025	5,797	217,957	212,721	5,236
Communication	203,579	203,165	415	249,636	247,828	1,808	308,750	306,817	1,933
Electric, Gas Utility	158,581	158,191	390	190,326	184,624	5,702	229,614	219,677	9,937
Water Utility	13,478	13,475	3	16,760	16,379	381	20,680	20,176	504
Wholesale Trade	174,427	170,827	3,600	234,564	227,077	7,487	305,910	300,092	5,818
Finance, Insurance, Real Estate	445,759	442,427	3,332	646,236	558,520	87,716	868,469	708,954	159,516
Amusement, Services	203,691	203,303	388	233,583	232,375	1,208	270,061	269,120	940
Retail Stores	748,269	740,713	7,556	908,386	894,632	23,755	1,099,687	1,072,606	27,082
Medical And Educa- tional Institutions	199,899	198,751	1,148	256,383	251,822	4,561	326,032	321,326	4,706
Auto Dealers, Service Stations	155,083	153,283	1,800	187,329	181,809	5,520	224,827	218,249	6,578
Construction	204,027	179,056	102,622	240,131	199,690	275,356	240,959	226,215	312,981

Table 66

SUMMARY OF INDUCED EFFECTS
OCEAN COUNTY, NEW JERSEY
(Percent Change)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Population	- .04	- .38	- .51
Population Density	- .00	- .40	- .55
Net Population Migration	- .36	- 2.89	- 1.55
Civilian Labor Force	- .04	+ .34	+ .59
Civilian Persons Employed	- .04	+ .50	+ .75
Civilian Unemployment Rate	- .45	- 2.15	- 1.97
Earnings	+ .00	+ .73	+ 1.05
Personal Income	- .00	+ .52	+ .75
Property Income	- .02	+ .56	+ .84
Per Capita Income	+ .03	+ .89	+ 1.27
State and Local Government Expenditures and Purchases (Excluding Construction and Employee Compensation)	+ .01	+ .75	+ .50
Personal Consumption Expenditures	- .02	+ .36	+ .61
Private Investment	- .00	+ .52	+ .74
Construction	- .03	+ .41	+ .37
Equipment Purchases	- .07	+ .89	+ 1.28
Gross Regional Product	- .01	+ 13.36	+ 20.20
Domestic Output	- .00	+ 16.48	+ 24.79
Total Supply	- .00	+ 16.47	+ 24.73
Total Demand	- .02	+ 5.56	+ 8.68

Local Summary-- Ocean County, New Jersey

Ocean County, New Jersey 1980

1. Population is moving out of Ocean County, New Jersey to support Baltimore Canyon activity in other coastal New Jersey counties.
2. Only slight changes in economic activity occurs.
3. Resources are being drawn out of Ocean County, New Jersey to other coastal New Jersey counties.
4. Only a slight induced increase of income is received by those remaining in the county.
5. No significant changes are induced in Ocean County, New Jersey by Baltimore Canyon activity.

Ocean County, New Jersey 1985

1. An even greater number of persons are leaving Ocean County, New Jersey to support Baltimore Canyon activity in other areas.
2. A significant increase of economic activity occurs in the petroleum mining sector, petroleum refining (gas processing), transportation, and construction sectors.
3. The movement of persons out of Ocean County, New Jersey minimizes the amount of infrastructure construction needed to support Baltimore Canyon activity within the county.
4. Resources are drawn to Ocean County, New Jersey but not at significant levels.
5. Only small increases in income are induced in Ocean County, New Jersey.
6. Equipment purchases increased but not significantly.
7. Private industry is not investing heavily in Ocean County, New Jersey.
8. State and local government activity increases to support Baltimore Canyon activity.
9. Increased Federal monies are spent in Ocean County, New Jersey to support Baltimore Canyon activity.

Ocean County, New Jersey 1990

1. The number of persons leaving Ocean County, New Jersey to seek economic opportunity elsewhere is decreasing but the decrease in population from the base case is even greater.
2. Economic activity continues to be increased in the petroleum mining, petroleum refining (gas processing), transportation, and construction sectors. Induced economic activity however, also occurs in the chemicals, plastics, machines, miscellaneous manufacturing, wholesale trade, retail stores, auto dealers, and service station sectors. Induced change in the county's production is significant.
3. The continued migration of persons out of Ocean County, New Jersey has minimized the amount of infrastructure construction needed in the county. Problems stemming from over extension are not likely.
4. Equipment purchases have been induced in the transportation sector.
5. Resources are being drawn into the county but/at significant levels.
not
6. Only small increases in income are received by those remaining in Ocean County, New Jersey.
7. Private industry is only investing lightly in Ocean County, New Jersey.
8. Resources are being drawn from the finance, insurance, and real estate sectors to other sectors within Ocean County, New Jersey.

9. Induced increases of State and local government activity falls.
10. Increased Federal monies are spent in Ocean County, New Jersey to support Baltimore Canyon activity.

For most non-New Jersey coastal county and city areas within the Mid-Atlantic coastal region, the changes induced by Baltimore Canyon activity have been found to be less than 1 percent from base case levels for the years examined (1980, 1985, and 1990). Some of the larger impacts on the urban areas of the Mid-Atlantic coastal region are now presented. The relative importance of these changes are not great when the level of induced activity is compared to existing levels of economic activity.

Impacts On Urban Areas - Delaware

In Delaware, the only area where induced industrial sector increases in output of greater than \$100,000 occurs in New Castle County. The following table lists these changes:

New Castle County, Delaware Induced Output (Thousand Dollars)		
	<u>1980</u>	<u>1985</u>
Chemicals, Plastics		101
Iron and Steel	106	
Construction	103	

The major industrial area in the county is the city of Wilmington, Delaware. Resources are drawn from the county to other areas. In 1985, Baltimore Canyon activity increased per capita income in the county by \$3. Induced production in the county amounted to \$.4 million in 1990 while only 116 persons were induced to leave the county. These changes represent less than a 1 percent difference from base case levels.

Impact on Urban Areas Coastal Maryland

In Maryland, several coastal areas experience induced industrial sector increases in output of greater than \$100,000. These areas include Anne Arundel County, Baltimore County, Baltimore City, Harford County, and Prince Georges County. Heavy industry is stimulated in Baltimore County and Baltimore City in 1980. Lighter industry and more service industry activity is induced in all of the above named areas. Anne Arundel County experiences an induced decrease of income which indicates that resources are being drawn from the county. Harford and Prince Georges Counties experience a decrease in induced construction. Selected data is now presented for the major coastal urban areas of Maryland (Baltimore County and Baltimore City).

Baltimore County Maryland Induced Income Effects (Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Personal Income	719,000	4,461,000	7,840,000
Earnings	762,000	3,990,000	6,665,000
Per Capita Income	1	4	4

Baltimore County Maryland
Induced Output Effects
(Thousand Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Iron and Steel	592	239	
Other Metals	114		
Machines, Miscellaneous Manufacturing	146	232	235
Transportation		282	598
Communication			119
Wholesale Trade		462	924
Retail Stores		627	1116
Medical and Educational Institutions			118
Auto Dealers, Service Stations		154	311
Construction		124	428
(Residential Construction)			154

In Baltimore County, resources are being drawn from the county in 1980 and into the county in 1990. Economic opportunity has decreased in 1980 and increased in 1985 and 1990. Population levels are 226 and 626 persons greater than without development levels for the years 1985 and 1990. Gross regional product in the county rises \$.4 million in 1980, \$4.1 million in 1985, and \$7.4 million in 1990. Induced changes are less than 1 percent from base case levels.

Baltimore City Maryland
Induced Income Effects
(Dollars)

	<u>1980</u>	<u>1985</u>	
Personal Income	1,432,000	2,504,000	2,626,000
Earnings	1,524,000	2,708,000	2,779,000
Per Capita Income	2	4	3

Baltimore City Maryland
Induced Output Effects
(Thousand Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Iron and Steel	245	115	
Other Metals	324	228	
Machines, Miscellaneous Manufacturing	338	498	280
Transportation	125	282	361
Wholesale Trade	109	304	416
Retail Stores	210	394	566
Construction	618	513	171
Finance, Insurance, Real Estate		164	495

The impact of Baltimore Canyon activity is smaller on Baltimore City than it is on Baltimore County. Throughout the period under consideration resources are mostly being drawn from the City. Economic opportunity, however, has begun to expand in 1990. In 1985, a peak population decrease of only 248 persons below the base case is experienced. Induced increases of gross regional product in Baltimore City are \$1.5 million in 1980, \$2.8 million in 1985, and \$3.5 million in 1990. These changes are less than 1 percent from base case levels.

Impacts on Urban areas - Coastal New Jersey

In New Jersey, several coastal areas other than Atlantic, Cape May, Monmouth, and Ocean Counties experience induced industrial sector increases in output of greater than \$100,000. These areas include Bergen County, Burlington County, Camden County, Essex County, Hudson County, Mercer County, Middlesex County, Passaic County, and Union County New Jersey. Data is presented for those counties containing major urban areas.

Bergen County, New Jersey
Induced Income Effects
(Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Personal Income	814,000	1,170,000	1,859,000
Earnings	1,009,000	1,684,000	2,118,000
Per Capita Income	2	4	2

Bergen County, New Jersey
Induced Output Effects
(Thousand Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Chemicals, Plastics		151	152
Other Metals	243	149	
Machines, Miscellaneous Manufacturing	627	822	256
Transportation		131	199
Wholesale Trade	100	345	467
Finance, Insurance, Real Estate			285
Retail Stores	185	335	394

Resources are drawn out of Bergen County for all years. Economic opportunity in other areas induced persons to leave Bergen County in all years examined. Induced population decreases were 162 persons in 1980, 416 persons in 1985, and 115 persons in 1990. Induced decreases of equipment purchases and construction occurred in 1985 and 1990. All changes, however, were less than 1 percent from base case levels.

Camden County, New Jersey
Induced Income Effects
(Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Personal Income	2,716,000	461,000	147,000
Earnings	2,317,000	390,000	704,000
Per Capita Income	2	11	8

Camden County, New Jersey
Induced Output Effects
(Thousand Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Leather, Glass, Stone	154	209	
Transportation	234		
Wholesale Trade	383		128
Finance, Insurance, Real Estate	-208	-173	-134
Retail Stores	430		
Auto Dealers, Service Stations	112		
Construction	2,095		

The largest effects in Camden County occur in 1980. Private industry has invested greater than \$7.5 million in 1980. Induced decreases of private investment occurs in later years. Induced increases in economic opportunity occur in 1980 and 1990. Economic opportunity decreases in 1985. Population levels are 272 persons greater than the base case level in 1980 and 1,189 and 777 persons less than base case levels in 1985 and 1990. The induced increase in gross regional product in Camden County is nearly \$2.8 million. All changes induced in Camden County are less than 1 percent from base case levels.

Essex County, New Jersey
Induced Income Effects
(Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Personal Income	677,000	1,179,000	1,330,000
Earnings	901,000	1,393,000	1,359,000
Per Capita Income	1	1	-2

Essex County, New Jersey
Induced Output Effects
(Thousand Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Chemicals, Plastics		146	183
Other Metals	268	164	
Machines, Miscellaneous, Manufacturing	350	320	
Transportation	114	273	344
Wholesale Trade		139	237
Finance, Insurance Real Estate		129	352
Retail Stores			144
Construction	184		

Resources flow out of Essex County to other areas. The induced increase of gross regional product in the county is \$1.8 million. Economic opportunity initially decreases in 1980 and then increases in 1985 and 1990. Population levels are only 135 persons from the 1980 base case and 72 persons and 547 persons from 1985 and 1990 base case levels. All changes induced by Baltimore Canyon activity are less than 1 percent from base case levels.

Hudson County, New Jersey
Induced Income Effects
(Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Personal Income	292,000	311,000	1,802,000
Earnings	443,000	755,000	1,078,000
Per Capita Income	2	5	-11

Hudson County, New Jersey
Induced Output Effects
(Thousand Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Chemicals, Plastics			114
Other Metals	210	157	
Machines, Miscellaneous Manufacturing	439	487	214
Transportation		245	319
Electric, Gas Utility			-131
Wholesale Trade			144
Finance, Insurance, Real Estate		254	873

Resources leave Hudson County in all years examined. Economic opportunity decreases in 1980 and 1985 and increases in 1990. Population levels are 111 and 484 persons below 1980 and 1985 base case levels and 1,330 persons above the 1990 level. An induced increase of production of \$1.9 million in 1990 occurs. A decrease in port activity is caused by the replacement of oil imports in Hudson County by Baltimore Canyon oil production.

Union County, New Jersey
Induced Income Effects
(Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Personal Income	974,000	1,274,000	797,000
Earnings	1,167,000	1,540,000	994,000
Per Capita Income	6	8	3

Union County, New Jersey
Induced Output Effects
(Thousand Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Chemical, Plastics		161	163
Other Metals	391	283	
Machines, Miscellaneous Manufacturing	623	796	247
Transportation	118	128	
Wholesale Trade	197	304	252
Finance, Insurance, Real Estate	-271	-224	
Retail Stores	176	149	
Construction	274	278	

Resources flow out of Union County for all years. Population levels are 355, 331, and 126 persons below base case levels for 1980, 1985, and 1990. An induced increase of regional production in Union County is \$1.4 million in 1985. Port activity needed to support exploration occurs in 1976, 1977, and 1978. Some infrastructure construction occurs during these years mostly in the residential construction sector. Economic opportunity decreases in 1980 and increases in 1985 and 1990. All induced changes in Union County are less than 1 percent from base case levels.

Impacts on Urban Areas-Coastal New York

In New York, several coastal areas experience induced industrial sector increases in output of greater than \$100,000. These areas include Albany County, Dutchess County, Nassau County, New York City, Orange County, Rockland County, Suffolk County, Ulster County, and Westchester County. Data is presented for those major urban areas experiencing the largest induced impacts.

Nassau County, New York Induced Income Effects (Dollars)			
	<u>1980</u>	<u>1985</u>	<u>1990</u>
Personal Income	1,972,000	178,000	4,010,000
Earnings	2,195,000	3,581,000	3,243,000
Per Capita Income	3	21	-3

Nassau County, New York
Induced Output Effects
(Thousand Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Other Metals	299	173	
Machines, Miscellaneous Manufacturing	518	735	281
Transportation		166	145
Wholesale Trade	193	464	453
Finance, Insurance, Real Estate			125
Retail Stores	339	708	693
Auto Dealers, Service Stations		130	
Construction	1,086	936	267

Resources flow out of Nassau County to support Baltimore Canyon activity. Population levels are 382 and 5,320 persons below base case levels in 1980 and 1985 and 1,211 persons above the base case level in 1990. Net population migration levels have decreased by 383 and 4,986 persons in 1980 and 1985 and increased by 6,570 persons in 1990. These figures suggest that Baltimore Canyon activity induces persons to seek economic opportunity outside of Nassau County in 1980 and 1985 and within Nassau County in 1990. An induced increase of regional production of \$3.4 million occurs in 1985. Baltimore Canyon activity also induces a decrease of residential construction in Nassau County in 1986, 1987, and 1988. Some of the induced changes that occur in Nassau County may be significant in absolute terms but all changes are less than 1 percent from base case levels.

New York City, New York
Induced Income Effects
(Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Personal Income	13,401,000	31,079,000	47,848,000
Earnings	15,242,000	30,863,000	47,690,000
Per Capita Income	2	2	2

New York City, New York
Induced Income Efforts
(Thousand Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Chemicals, Plastics	172	325	325
Leather, Glass, Stone	235	345	159
Iron and Steel	155	252	507
Other Metals	1,359	826	138
Machines, Miscellaneous Manufacturing	3,062	5,391	5,846
Transportation	1,584	4,240	6,956
Communication	134	193	635
Wholesale Trade	1,603	6,695	9,721
Finance, Insurance, Real Estate	354	535	1,076
Amusement, Services	72	197	458
Retail Stores	2,722	5,262	8,977
Medical and Educational Institutions	110	79	168
Auto Dealers, Service Stations	419	853	918
Constructions	25,815	33,434	23,083

Industry is investing heavily in Kings County. New York City's port facilities are being utilized to support Baltimore Canyon operations. Resources are flowing into Kings County for all years examined and into New York County in 1985 and 1990. With these exceptions, resources are flowing out of New York City to support Baltimore Canyon activity in other areas. In 1985, private industry invests greater than \$104.4 million in Kings County to support off-shore operations. Induced economic opportunity decreases in New York City in 1980 and increases in 1985 and 1990. Population levels are 1,109 persons less than the base case level in 1980 and 2,209 and 3,301 persons greater than the base case levels in 1985 and 1990. Induced increases of the city's production rises over time peaking at \$141.1 million in 1990. A decrease in port activity in New York City is caused by the replacement of oil imports by Baltimore Canyon oil production. While some of the changes in New York City may be significant in absolute terms, most changes are less than 1 percent from base case levels.

Suffolk County, New York
Induced Income Effects
(Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Personal Income	-686,000	-527,000	608,000
Earnings	-287,000	75,000	841,000
Per Capita Income	1	2	1

Suffolk County, New York
Induced Output Effects
(Thousand Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Other Metals	159		
Machines, Miscellaneous Manufacturing	228	175	
Transportation		-109	
Wholesale Trade	-141	-158	
Finance, Insurance, Real Estate			153
Retail Stores	-102		169
Construction	-482	-568	-244

Resources are leaving Suffolk County to support Baltimore Canyon activity elsewhere for all years examined. Induced decreases of the county's production occur in 1980 and 1985 and an induced increase of \$.7 million occurs in 1990. Population levels are below base case levels for all years examined. Baltimore Canyon activity induces persons to leave Suffolk County in 1980 and 1985 and enter the county in 1990. All induced changes occurring in Suffolk County are less than 1 percent from base case levels.

Impacts on Urban Areas - Coastal Pennsylvania

In Pennsylvania, the coastal areas of Bucks County, Delaware County, and Philadelphia County experience induced industrial sector increases in output of greater than \$100,000. Data is presented for the urban counties of Delaware County and Philadelphia County.

Delaware County, Pennsylvania
Induced Income Effects
(Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Personal Income	424,000	252,000	1,663,000
Earnings	476,000	395,000	1,522,000
Per Capita Income	1	1	1

Delaware County, Pennsylvania
Induced Output Effects
(Thousand Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Agriculture, Food			122
Lumber, Wood Products			420
Chemicals, Plastics			286
Other Metals	132		
Machines, Miscellaneous Manufacturing			579
Wholesale Trade			123
Finance, Insurance, Real Estate		356	3,835
Retail Stores		177	1,688
Construction	128		

Resources flow out of Delaware County for all years under examination. Economic opportunity induces persons to leave Delaware County in 1980 and 1985 and enter the county in 1990. Induced production in Delaware County is \$.5 million in 1980, \$.1 million in 1985, and \$3.0 million in 1990. Port activity in the county is decreased by the replacement of oil imports by Baltimore Canyon oil production.

Philadelphia County, Pennsylvania
Induced Income Effects
(Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Personal Income	2,443,000	7,009,000	8,736,000
Earnings	2,818,000	7,160,000	8,603,000
Per Capita Income	2	4	2

Philadelphia County, Pennsylvania
Induced Output Effects
(Thousand Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Chemicals, Plastics	142	251	250
Leather, Glass, Stone	134	176	
Iron and Steel	237	102	
Other Metals	391	239	
Machines, Miscellaneous Manufacturing	1,164	1,596	559
Transportation	223	795	1,147
Wholesale Trade	167	979	1,488
Finance, Insurance, Real Estate			149
Retail Stores	279	987	1,465
Auto Dealers, Service Stations		122	235
Construction	1,369	958	461

Resources flow into Philadelphia County in 1980, out of the county in 1985, and back into the county 1990. The port area supports exploration activity in 1976, 1977, and 1978. Some residential construction is induced. Equipment purchases are made to support Baltimore Canyon activity.

The county's production increases by \$2.8 million in 1980, \$8.0 million in 1985, and \$10.9 million in 1990. Economic opportunity however induces persons out of the county in 1980 and 1985 and back into the county in 1990. Population levels are 355 and 386 below 1980 and 1985 base case levels and 319 above the 1990 base case level. All changes induced by Baltimore Canyon activity are less than 1 percent from base case levels.

Impacts on Urban Areas - Coastal Virginia

In Virginia, the only coastal areas experiencing induced industrial sector increases in output of greater than \$100,000 are Hampton City, Newport News City, and Norfolk City. The effects of Baltimore Canyon activity on Virginia are minimal.

Hampton City, Virginia Induced Output Effects (Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Personal Income	70,000	60,000	44,000
Earnings	62,000	66,000	40,000
Per Capita Income	1	2	2

Hampton City, Virginia Induced Output Effects (Thousand Dollars)

	<u>1985</u>	<u>1990</u>
Transportation		147
Retail Stores	149	256

Resources flow out of Hampton City in 1980 and into the city in 1985 and 1990. Economic opportunity decreases in 1980 and increases in 1985 and 1990. Population levels are 55 below the 1980 base case level and 88 and 262 above the 1985 and 1990 levels. Hampton City production decreases \$.1 million in 1980 and increases \$.8 million and \$1.6 million in 1985 and 1990. All changes are less than 1 percent from base case levels.

Newport News City, Virginia
Induced Income Effects
(Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Personal Income	224,000	723,000	815,000
Earnings	238,000	713,000	797,000
Per Capita Income	1	4	5

Newport News City, Virginia
Induced Output Effects
(Thousand Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Machines, Miscellaneous Manufacturing	<u>493</u>	705	276
Retail Stores			108

Resources flow out of Newport News City in 1980 and 1985 and into the City in 1990. Economic opportunity decreases in 1980, increases slightly in 1985, and decreases again 1990. Population levels are only slightly below base case levels for all years examined. Induced increases in Newport News City production are \$.2 million in 1980, \$.7 million in 1985, and \$.9 million in 1990. All changes are less than 1 percent from base case levels.

Norfolk City, Virginia
Induced Income Effects
(Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Personal Income	311,000	3,973,000	6,396,000
Earnings	348,000	3,463,000	5,365,000
Per Capita Income	1	6	4

Norfolk City, Virginia
Induced Income Effects
(Thousand Dollars)

	<u>1980</u>	<u>1985</u>	<u>1990</u>
Transportation		347	571
Wholesale Trade		455	771
Retail Stores		534	881
Auto Dealers, Service Stations		148	266
Construction	158	228	223

Norfolk City experiences the greatest induced effects in coastal Virginia. Resources flow out of the city in 1980 and into the city 1985 and 1990. Economic opportunity decreases in 1980 and increases in 1985 and 1990. Population levels are 20 persons below the 1980 base case level and 276 and 605 persons above the 1985 and 1990 base case levels. The city's production increases \$.3 million in 1980, \$3.7 million in 1985 and \$6.0 million in 1990. Some residential construction increases occur in 1988, 1989, and 1990. All changes are less than 1 percent from base case levels.

D. IMPLICATIONS

Implications for Other Possible Scenarios

Due to the nature of the existing economic structure of the Mid-Atlantic coastal region, certain trends that are shown under the hypothesized assumptions could also be expected to occur under differing assumptions. Using different siting assumptions, private industry can still be expected to invest heavily in primary impacted areas during the early years of Baltimore Canyon activity and withdraw funds from other areas. Private investment can be expected to decrease over time but become more widely distributed as economic opportunity increases in more areas within the region. Resources could be expected to be drawn to primary impacted locales from areas within the Mid-Atlantic coastal region and areas outside the region. The largest proportion of resources should come from outside the region.

Population could be expected to move to concentrated areas of economic opportunity during the early years of Baltimore Canyon activity. A specific locale experiencing a large population influx could expect some proportion of the increased population to migrate away from areas of primary impact to other areas offering increased economic opportunity during the later years of Baltimore Canyon activity. Persons could be expected to be drawn from both unemployed and employed ranks of the civilian labor force. To avoid some of the problems that may be caused by an overextension of economic activity, large increases in infrastructure construction activity should be based on a knowledge of the level of population increase that can be considered permanent. Coastal zone planning is required.

Induced increases in economic opportunity could be expected in heavy industries during the early years and shift toward lighter industry and service oriented economic opportunity during the later years. Heavy industries include iron, steel, other metals, plastics, chemicals, machines, and miscellaneous manufacturing. Lighter and service oriented industries include construction, transportation, wholesale trade, retail stores, auto dealers, and service stations. Increased economic opportunity should become more widely distributed over time. The existing heavy industries within the Mid-Atlantic coastal region could be expected to be heavily relied upon even under differing assumptions, thus decreasing the incentive for new heavy industries to be built within the region. Expansion of existing industries can be expected. New industries can be expected only under conditions of certainty and profitability. The area can be expected to depend on industries outside the Mid-Atlantic coastal region. Equipment can be expected to be purchased from outside the region, shipped to the area, and constructed within the region.

If imported oil is not replaced and refineries are built, there is a possibility that new petrochemical complexes could accompany the new refineries. Expansion of existing refineries could result in the expansion of petrochemical activity, given the restriction that emission levels do not surpass legislated standards.

State and local government activity can be expected to expand in impacted areas. The decision to invest heavily in a given area could have extensive effects on the workers and suppliers of goods and services. Increased income and employment opportunity can be expected to result. Increased infrastructure expenditures could be needed to support increased population and economic activity. To the extent that Baltimore Canyon activity stimulates growth in new and existing industries within the Mid-Atlantic coastal region, economic activity can be expected to increase. Increased economic opportunity in impacted areas can provide an increased tax base with which to finance some of the increased governmental activity required. Increased Federal revenues can be expected to return to localities as Baltimore Canyon production of oil and gas moves toward peak levels. Our analysis indicates increased Federal revenues will return to these areas, despite the fact that we did not assume any special impact funds or revenue sharing. This occurred through the normal process of distribution of Federal funds.

A significant improvement in the balance of payments will result only if Baltimore Canyon oil production replaces imported oil. Gas shortage problems could be reduced over time if Baltimore Canyon produced gas reaches the Mid-Atlantic coastal region markets. For this to be possible, gas processing plants are required to be built within the region. Baltimore Canyon oil and gas production is likely to reduce the dependence of the Mid-Atlantic coastal region on petroleum mining and petroleum refining activity outside the region.

Any decision to lease the Baltimore Canyon would result in the production of certain OCS related goods and services. In our economy resources are limited. In order for goods and services to be produced so as to support Baltimore Canyon activity, production of other goods and services within the economy would be foregone. This foregone production could be energy related, food related, shelter related, transportation related, etc. For example, the steel used to build a rig that is drilling for oil and gas in the Baltimore Canyon could possibly have been used to build a tractor so as to produce food. Persons moving to a primary impacted county to construct an onland oil terminal could possibly have remained in their original county to build a house. The use of the steel and labor in the above examples to support Baltimore Canyon activity requires that these factors of production cannot be employed elsewhere in the economy and as such represents a cost and irreversible and irretrievable commitment of resources at a particular point in time. The cost of leasing the Baltimore Canyon can only be measured by the value of the opportunities foregone by taking the action and employing scarce resources of Baltimore Canyon related activity. To the extent that unemployed resources are used, whether they be labor, capital, or materials, to support Baltimore Canyon activity, society does not incur a cost. Those resources to be employed in Baltimore Canyon related activity which are not previously producing any goods and services do not require foregoing opportunity elsewhere in the

economy and as such do not represent a cost to society. With unemployment of labor existing in the area, for example, some portion of the labor supply can be expected to be drawn from the ranks of the unemployed. As such the wage rates paid to these persons would not represent a cost to society.

Increases in the population of a particular area due to net in-migration as a result of direct investment in the area, in addition to the locating of primary industrial facilities to support Baltimore Canyon development, cannot be avoided. Population increases will be directly related to the locational and investment tendencies associated with these facilities. Unavoidable adverse impacts upon the physical and service system infrastructure as a result of OCS induced population impacts will depend upon the availability, capability, and elasticity of the infrastructure systems of the area in which the induced population growth takes place. Visible adverse impacts, overutilization of infrastructure systems, inability of the systems to absorb and/or accommodate the additional population, will be most pronounced in areas having limited or underdeveloped infrastructure systems and/or comparatively small populations. In large highly urbanized and industrialized areas the influx of population would not be as great, due to labor force availability within the area. Because of the larger existing population, OCS associated increases would not be perceptible. The ensuing infrastructural impacts, though unavoidable, would be negligible.

When a given area is unable to absorb needed increased infrastructure expenditure and economic activity and excess resources are unable to be shifted elsewhere, problems in the form of shortages of supply and dislocations in local economies will result. Allocational problems with regard to the pattern and nature of the production of goods and services will occur. Consumers within the locality will be affected adversely. Consumption patterns on the demand side, as well as production patterns on the supply side, will need to shift so as to remove excess demand. The adjustment of a local economy to spot shortages in its economy requires time. The adjustment is not immediate and dislocations will be experienced as the local economy works its way to equilibrium. Given the assumptions as hypothesized, Cape May and Atlantic Counties New Jersey would be the most likely areas to experience such adverse impacts.

Heavy private investment in an area where the level of existing economic activity is light and of a limited nature will cause impacts upon the quality of life experienced by the persons in that particular area. The reallocation of resources to support Baltimore Canyon activity is an unavoidable impact. Factors of production in the form of labor, capital, and materials are scarce and as such, will be moved to areas of high economic incentive resulting from the sale of the Baltimore Canyon.

Technology is often fixed in the short term. Factors of production used to produce the products needed to support Baltimore Canyon activity can only be combined in a limited number of ways. Factors external or

coastal

internal to the Mid-Atlantic/region may determine whether a firm locates a particular facility within the area. When a preferred locality is either unable or unwilling to provide needed economic activity and substitute sites are not available, inefficiencies can be expected to occur with higher costs and prices being experienced by producers and consumers. Diseconomies will also result when industrial location decisions do not consider the efficiency and feasibility of a given site. To the extent that local conditions prevent efficiency, higher costs and prices than are necessary could be expected.

A condition of uncertainty and less than perfect information will also create unavoidable adverse impacts. To the degree that decisions are based on predictions or estimates that are proved to be in error over time, adverse impacts will occur to firms in the form of commercial ventures that do not cover their costs. It is not likely that uncertainty could be completely removed from the decision making process. Private industry and government, while basing their decisions on as much information as possible, will be unable to avoid the adverse impacts caused by uncertainty. Inefficient use of resources would also result from a lack of coordination between the private and public sectors and the improper sequencing of decisions on all levels.

We can view an economic market as an allocator of scarce resources in that it generates information about tastes and technologies in the form of prices. These prices can be viewed as signals that are used by economic agents to arrive at supply and demand decisions. Imperfections

can be expected in the markets over time. Individuals and firms will be basing their decisions on price levels that do not contain the information necessary for economic agents to reach efficient allocation decisions. Unavoidable adverse impacts will stem from the fact that market prices will not reflect the true cost in terms of foregone output that might occur from shifting resources to the Baltimore canyon area. Price levels will not be based on all values that all members of our society deem to be important. To the extent that values society deems to be important are not reflected in the market place, an inefficient allocation of resources can be expected from the action under consideration. It is not likely that these values can be ascertained and quantified so as to be reflected in the market place.

These values are not known and are extremely difficult to determine. The formulation of a consistent social welfare function that is based on such concerns as the destruction of delicate ecosystems, the quality of recreation and aesthetic experiences, the threat of extinction to endangered species, human health and life, National security, and the optimum trade off between pollution levels and economic growth is not possible. Without a consensus being reached the leasing of the Baltimore Canyon will result in the inefficient allocation of resources to and within the Mid-Atlantic coastal region. Legislative controls by State and local authorities can be expected to mitigate some but not all of the inefficiencies that will occur.

It is hoped that the trends that have been isolated by the economic analysis will be helpful in the understanding of the impacts that may result from Baltimore Canyon activity. Although the level of detail presented may not be great enough to meet all local planning needs, the results presented should suggest certain problems that may result and lead to more detailed study that could be undertaken should an actual development-production plan be formulated and Baltimore Canyon activity occur.

CHAPTER IV

FURTHER APPLICATIONS OF RESULTS

Changes in the levels of industrial and commercial activities and in the population of the Mid-Atlantic coastal counties affected by offshore oil and gas activities could generate changes in air and water pollution levels. Realizing that estimates of these increased loadings would only be reliable if they were consistent with the projected levels for the with and without development scenarios used in the economic model, we have used the Strategic Environmental Assessment System (SEAS) of the Environmental Protection Agency to obtain our estimates.

SEAS is a system of interdependent computer modules which utilizes pre-existing demographic, economic, and technical information to forecast environmental information. Within the limits of economic growth patterns that serve as input, it can estimate air and water pollution emissions as a function of the levels of industrial and commercial activities and population. It employs pollution coefficients which consist of two values. The first value determines the amount of pollution emitted per unit of activity without pollution control, and the second value represents the fraction of emissions which is captured in a particular year given that year's level of pollution control regulations. These levels of pollution abatement are determined by the guidelines established by EPA for various years. The pollution coefficients are applied

to the economic and population information supplied by the economic model. The results, when combined with outside analysis, provide a tool for assessing environmental consequences of various scenarios.

BLM employed the SEAS working group and International Research and Technology Corporation (IRT) to generate the information and perform the analysis. Eighty-one counties were investigated by the economic model. Due to limited time and funding, only four of these, Atlantic, Cape May, Monmouth, and Ocean Counties, New Jersey were selected for additional analysis. These were the four counties indicated by the economic model as experiencing the greatest percentage increases in the activities of industrial and commercial sectors and in population. The economic model provided projections for the years 1975 through 1990 for the level of activity in the 99 industrial and commercial sectors and for the levels of population for these four counties. The industrial and commercial sector information was then disaggregated into the 185 sectors necessary for the SEAS model so as to obtain the level of detail necessary to provide a valid environmental analysis. Pollution coefficients were applied and other data sources were employed to generate estimates of air and water pollution and evaluate the effects.

The conclusions presented are those developed by the SEAS working group and IRT. They are dependent on the with and without development scenarios prepared as input into the economic model, the

results of the economic model which served as input into the SEAS model, and other assumptions which the SEAS group and IRT were required to make. The results and conclusions do not predict direct effects on ambient air and water quality because the SEAS model can only estimate pollution emissions. They can however serve as flags to indicate potential problem sources in potentially susceptible counties. The following discussion describes the types of outside information used, the assumptions made, and the pollution estimates determined during this analysis. These are followed by the conclusions, a description of the limitations of the study, and of future applications involving greater use of SEAS potentials.

Air Quality

For determining increases in air pollution, the levels of activity for the industrial sectors were taken directly from the economic model while the levels for some consumer activities had to be determined from a number of sources for the base year (1975) and then projected from the forecasted economic or population levels supplied by the economic model. Pollution coefficients developed for SEAS could then be applied for the years desired.

Pollution emissions for personal and freight transportation were measured as a function of vehicle miles traveled (VMT). An estimate of the total miles traveled in the four counties for the base year

was provided by the Federal Highway Administration. Projections for other years were determined as a function of the growth rate of personal income supplied by the economic model. The total vehicle miles traveled for each year was then divided between personal and freight transportation using a predetermined ratio. (The VMT for freight transportation was obtained from the Census of Truck Inventory for the State of New Jersey and prorated on a county basis. This figure was then used to determine the ratio of freight VMT to total VMT for each county.)

Fuel use was divided into residential, commercial, and industrial consumption categories and then subdivided into natural gas, distillate oil, and coal categories. Pollution emissions for each were then determined as a function of the individual pollution coefficients and BTU's consumed. County data for residential fuel use was available in SEAS for the base year and the projections for other years were based on population growth information supplied by the economic model. SEAS also supplied the base year data for commercial fuel use for the State of New Jersey which was allocated to the four counties as a ratio of each county's commercial output to that of the State's. Projections for other years were based on the growth in key commercial sectors, e.g., wholesale trade and real estate/rentals. County data for industrial fuel use was available from SEAS for the four counties for the base year, and projections for other years were based on the levels of industrial activity supplied by the economic model.

Pollution emissions for the electrical utilities were not keyed to the economic model. Data on the generating capacities of existing plants and plants expected to come on line during the period of development in the four counties was provided by the Steam-Electric Plant Factors/1973 Edition, National Coal Association. Another report, Steam Electric Plant Air and Water Quality Control Data, 1974, Federal Power Commission, was used to estimate the actual percentage of full capacity used by each plant. Pollution emissions were then based on the average annual BTU(e)'s/by each plant for the years studied. Pollution coefficients were available from SEAS.

Pollution emissions for other consumer and industrial activities were also determined. For example, National levels of air pollution emissions for dry cleaning and painting were provided by SEAS and then allocated to each of the four counties on the basis of population. Projections for other years were then determined as a function of the increases in population supplied by the economic model. Hydrocarbon pollution emissions from gasoline storage facilities were measured as a function of the gasoline consumed in each county. This in turn was based on the VMT and the expected average miles per gallon for automobiles for each year studied. Projections of the increases in VMT were based on the growth rates of personal income supplied by the economic model. The pollution coefficients were supplied by the SEAS model. Pollution emissions for various industries were determined as a function of the individual pollution

coefficient for that year as given by the SEAS model and the level of industrial activity predicted by the economic model.

The air pollutants investigated are shown in Table 67 associated by their sources. The predicted tonnages for each pollutant generated in each of the four counties for both the with and without development cases are shown in Tables 68 through 87. The percentage increases for each pollutant are shown in Table 88.

The results indicate that the only significant increases occur in the levels of SO_x for all four counties and in the levels of HC and CO for Cape May County. The SO_x level increases are related to the new gas processing plants expected to be placed in each county. Although the quantity and makeup of the gas that would be discovered is not known, a "worst case" situation was used. This was based on the assumption that all gas discovered would have to undergo treatment for the removal of hydrogen sulfide (H_2S). (Natural gas can contain H_2S in quantities ranging from trace amounts to 50 percent. At present, approximately five percent of the gas in the United States has to undergo treatment.) It was also assumed that the required treatment would involve stringent pollution controls in the form of a Claus plant and a tail gas treatment facility. This combination would be capable of removing 99.8 percent of the sulfur. Based on these assumptions, the percentage increases in SO_x levels in the four counties over the

Table 67

Major Air Pollutants Associated by Source

SOURCE	MAJOR POLLUTANTS ¹
<u>TRANSPORTATION</u>	
Personal (Automobile and Bus)	SP, SO _x , NO _x , HC, CO
Freight (Trucks)	SP, SO _x , NO _x , HC, CO
<u>RESIDENTIAL FUEL USE</u>	
Natural Gas	SP, SO _x , NO _x , HC, CO
Distillate Oil	SP, SO _x , NO _x , HC, CO
<u>COMMERCIAL FUEL USE</u>	
Distillate Oil	SP, SO _x , NO _x , HC, CO
<u>INDUSTRIAL FUEL USE</u>	
Coal, Gas, Oil	SP, SO _x , NO _x , HC, CO
<u>ELECTRIC UTILITIES</u>	
Oil	SP, SO _x , NO _x , HC, CO
<u>INDUSTRIAL SOURCES</u>	
Gas Processing	SO _x , NO _x , HC
Construction	SP
Petroleum Refining and Storage	HC
Others (Chemicals, Manufacturing)	SP, SO _x , HC
<u>CONSUMER ACTIVITIES</u>	
Dry Cleaning	HC
Painting	HC
Gasoline Service Stations	HC

¹Suspended Particulates (SP), Sulfur Oxides (SO_x), Nitrogen Oxides (NO_x), Hydrocarbons (HC), and Carbon Monoxide (CO)

Table 68

ATLANTIC COUNTY
Suspended Particulates
(Tons)

Source	<u>1975</u>		<u>1980</u>		<u>1985</u>		<u>1990</u>	
	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>
Transportation								
Personal	338	338	440	406	456	443	508	493
Freight	50	50	79	66	106	81	109	100
Total	388	388	519	472	562	524	617	593
Fuel Combustion								
Res. Nat. Gas	28	28	28	28	28	28	28	28
Res. Dist. Oil	198	198	236	217	236	225	243	236
Coml. Dist. Oil	232	232	306	299	338	334	378	380
Industrial Comb.	158	158	133/203	133/203	151/229	151/229	171/259	171/259
Total	616	616	704/773	678/747	754/832	738/816	820/908	815/903
Electric Utilities	1100	1100	220/1190	220/1190	220/1190	220/1190	220/1190	220/1190
Industrial Sources								
Coml. Printing								
Structural Clay								
Gas Refining								
Total								
Consumer Acting								
Dry Cleaning								
Use Of Paints								
Gasoline Service								
Station								
Total								
Total Tons	2104	2104	1443/2482	1370/2409	1536/2584	1482/2530	1657/2715	1628/2686

W = With offshore development

W/O = Without offshore development

Slashed Numbers = The first number refers to the level of pollutants with stringent controls to meet required air pollution regulations. The second number refers to the level of pollutants with controls at the 1971 level.

Table 69

ATLANTIC COUNTY
Sulfur Oxides
(Tons)

Source	1975		1980		1985		1990	
	With	Without	With	Without	With	Without	With	Without
Transportation								
Personal	184	184	240	222	249	241	277	268
Freight	66	66	104	87	140	106	143	131
Total	250	250	344	309	389	347	420	399
Fuel Combustion								
Res. Nat. Gas	1	1	1	1	1	1	1	1
Res. Dist. Oil	547	547	654	602	654	623	672	654
Coml. Dist. Oil	290	290	383	374	423	417	473	475
Industrial Comb.	1351	1351	1633/1963	1633/1963	1857/2196	1857/2196	2077/2456	2077/2456
Total	2189	2189	2671/3001	2610/2940	2935/3274	2897/3237	3223/3602	3207/3586
Electric Utilities	1419	1419	304/1518	304/1518	304/1518	304/1518	304/1518	304/1518
Industrial Sources								
Coml. Printing					55/275	55/275	55/275	55/275
Structural Clay	122/236	122/236	56/278	56/278				
Gas Refining			1736/34000		3482/87000		3482/87000	
Total	122/236	122/236	1792/34278	56/278	3537/87275	55/275	3537/87275	55/275
Consumer Acting								
Dry Cleaning								
Use Of Paints								
Gasoline Service Station								
Total								
Total Tons	3980/4094	3980/4094	5111/39141	3279/5045	7165/92456	3603/5377	7484/92815	3965/5778

W = With offshore development
W/O = Without offshore development

Slashed Numbers = The first number refers to the level of pollutants with stringent controls to meet required air pollution regulations. The second number refers to the level of pollutants with controls at the 1971 level.

Table 70

ATLANTIC COUNTY
Nitrogen Oxides
(Tons)

Source	<u>1975</u>		<u>1980</u>		<u>1985</u>		<u>1990</u>	
	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>
Transportation								
Personal	3928	3928	4549	4190	3281	3190	3656	3548
Freight	1062	1062	1676	1398	2259	1709	2312	2122
Total	4990	4990	6225	5588	5540	4899	5968	5670
Fuel Combustion								
Res. Nat. Gas	16	16	16	16	16	16	16	16
Res. Dist. Oil	76	76	91	84	91	86	93	91
Coml. Dist. Oil	595	595	785	767	867	855	970	974
Industrial Comb.	347	347	362	362	408	408	455	455
Total	1034	1034	1254	1229	1382	1365	1534	1536
Electric Utilities	1227	1227	1315	1315	1315	1315	1315	1315
Industrial Sources								
Coml. Printing								
Structural Clay								
Gas Refining								
Total								
Consumer Acting								
Dry Cleaning								
Use Of Paints								
Gasoline Service								
Station								
Total								
Total Tons	7251	7251	8794	8132	8237	7579	8817	8521

W = With offshore development
W/O = Without offshore development

Table 71

ATLANTIC COUNTY
Hydrocarbons
(Tons)

Source	<u>1975</u>		<u>1980</u>		<u>1985</u>		<u>1990</u>	
	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>
Transportation								
Personal	7392	7392	5453	5022	2330	2266	2598	2521
Freight	450	450	647	540	836	635	856	785
Total	7842	7842	6100	5562	3166	2901	3454	3306
Fuel Combustion								
Res. Nat. Gas	12	12	12	12	12	12	12	12
Res. Dist. Oil	61	61	73	67	73	69	75	73
Coml. Dist. Oil	30	30	40	39	44	44	50	50
Industrial Comb.	17	17	22	22	25	25	28	28
Total	120	120	147	140	154	150	165	163
Electric Utilities	24	24	26	26	26	26	26	26
Industrial Sources								
Coml. Printing	44	44	60	60	4/70	4/70	5/75	5/75
Structural Clay	7/26	7/26	.5/18	.5/18	.3/11	.3/11	.3/11	.3/11
Gas Refining	-	-	-	-	-	-	-	-
Total	51/70	51/70	60.5/78	60.5/78	4.3/81	4.3/81	5.3/86	5.3/86
Consumer Acting								
*Dry Cleaning	82	82	77	73	90	87	100	97
**Use Of Paints	461	461	523	480	571	495	573	554
Gasoline Service Station	301	301	31/349	29/321	27/301	26/293	27/304	26/295
Total	844	844	631/949	582/874	634/908	608/875	700/977	677/946
Total Tons	8881/8900	8881/8900	6652/7283	6371/6680	3984/4335	3689/4033	4350/4708	4177/4527

W = With offshore development
W/O = Without offshore development

* = 1990 from PI(1990)/PI(1985) in 1990

Slashed Numbers = The first number refers to the level of pollutants with stringent controls to meet required air pollution regulations. The second number refers to the level of pollutants with controls at the 1971 level.

** = SEAS projections from 1985

Table 72

ATLANTIC COUNTY
Carbon Monoxide
(Tons)

Source	<u>1975</u>		<u>1980</u>		<u>1985</u>		<u>1990</u>	
	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>
Transportation								
Personal	59629	59629	45625	42623	16154	15710	18009	17482
Freight	3685	3685	5689	4747	7643	5783	7822	7178
Total	63314	63314	51314	47370	23797	21493	25831	24660
Fuel Combustion								
Res. Nat. Gas	32	32	32	32	32	32	32	32
Res. Dist. Oil	96	96	115	106	115	109	118	115
Coml. Dist. Oil	41	41	54	53	60	59	66	67
Industrial Comb.	25	25	32	32	36	36	40	40
Total	194	194	233	222	242	236	216	213
Electric Utilities	81	81	88	88	88	88	88	88
Industrial Sources								
Coml. Printing								
Structural Clay								
Gas Refining								
Total								
Consumer Acting								
Dry Cleaning								
Use Of Paints								
Gasoline Service								
Station								
Total								
Total Tons	63589	63589	51635	47680	24127	21817	26135	24961

W = With offshore development

W/O = Without offshore development

Table 73
CAPE MAY COUNTY
Suspended Particulates
(Tons)

Source	<u>1975</u>		<u>1980</u>		<u>1985</u>		<u>1990</u>	
	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>
Transportation								
Personal	77	77	107	107	142	118	152	147
Freight	10	10	16	14	36	16	52	20
Total	87	87	123	121	178	134	204	167
Fuel Combustion								
Res. Nat. Gas	12	12	12	12	12	12	12	12
Res. Dist. Oil	72	72	79	72	101	87	105	101
Coml. Dist. Oil	35	35	40	40	45	45	50	50
Industrial Comb.	36	36	31	31	30	30	32	32
Total	155	155	162	155	188	163	199	195
Electric Utilities	495	495	760	760	760	760	760	760
Industrial Sources								
Coml. Printing								
Structural Clay								
Gas Refining								
Total								
Consumer Acting								
Dry Cleaning								
Use Of Paints								
Gasoline Service								
Station								
Total								
Total Tons	737	737	1045	1036	1126	1057	1163	1122

W = With offshore development
W/O = Without offshore development

Table 74

CAPE MAY COUNTY
Sulfur Oxides
(Tons)

Source	1975		1980		1985		1990	
	With	Without	With	Without	With	Without	With	Without
Transportation								
Personal	42	42	58	58	78	64	83	80
Freight	13	13	21	18	48	21	69	27
Total	55	55	79	76	126	85	152	107
Fuel Combustion								
Res. Nat. Gas	1	1	1	1	1	1	1	1
Res. Dist. Oil	200	200	220	200	280	240	290	280
Coml. Dist. Oil	70	70	80	80	90	90	100	100
Industrial Comb.	305	305	376	376	371	371	394	394
Total	576	576	677	657	742	702	785	775
Electric Utilities	3941	3941	6050	6050	6050	6050	6050	6050
Industrial Utilities								
Coml. Printing								
Structural Clay								
Gas Refining	-	-	-	-	1736/34000	-	3482/87000	-
Total								
Consumer Acting								
Dry Cleaning								
Use Of Paints								
Gasoline Service								
Station								
Total								
Total Tons	4572	4572	6806	6783	8654/40918	6837	10469/93967	6932

W = With offshore development Slashed Numbers = The first number refers to the level of pollutants with stringent controls to meet required air pollution regulations. The second number refers to the level of pollutants with controls at the 1971 level.
W/O = Without offshore development

Table 75

CAPE MAY COUNTY
Nitrogen Oxides
(Tons)

Source	<u>1975</u>		<u>1980</u>		<u>1985</u>		<u>1990</u>	
	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>
Transportation								
Personal	897	897	1102	1102	1023	849	1093	1058
Freight	217	217	338	289	772	338	1109	434
Total	1114	1114	1440	1391	1795	1187	2202	1492
Fuel Combustion								
Res. Nat. Gas	6	6	6	6	6	6	6	6
Res. Dist. Oil	28	28	31	28	39	33	40	39
Coml. Dist. Oil	144	144	164	164	185	185	205	205
Industrial Comb.	78	78	83	83	82	82	86	86
Total	256	256	284	281	312	306	337	336
Electric Utilities	6436	6436	9879	9879	9879	9879	9879	9879
Industrial Sources								
Coml. Printing								
Structural Clay								
Gas Refining								
Total								
Consumer Acting								
Dry Cleaning								
Use Of Paints								
Gasoline Service								
Station								
Total								
Total Tons	7806	7806	11603	11551	11986	11372	12418	11707

W = With offshore development
W/O = Without offshore development

Table 76

CAPE MAY COUNTY
Hydrocarbons
(Tons)

Source	<u>1975</u>		<u>1980</u>		<u>1985</u>		<u>1990</u>	
	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>
Transportation								
Personal	1689	1689	1321	1321	726	603	776	751
Freight	92	92	130	112	286	125	410	161
Total	1781	1781	1451	1433	1012	728	1186	912
Fuel Combustion								
Res. Nat. Gas	5	5	5	5	5	5	5	5
Res. Dist. Oil	21	21	23	21	30	25	31	30
Coml. Dist. Oil	7	7	8	8	9	9	12	12
Industrial Comb.	4	4	5	5	5	5	6	6
Total	37	37	41	39	49	44	54	53
Electric Utilities	124	124	190	190	190	190	190	190
Industrial Sources								
Coml. Printing	18	18	23	23	28	28	33	33
Structural Clay								
Gas Refining								
Total	18	18	23	23	28	28	33	33
Consumer Acting								
Dry Cleaning	72	72	61/91	52/86	68/112	62/102	70/115	68/112
Use Of Paints	147	147	138	130	145	132	149	145
Gasoline Service								
Station	69	69	8/85	7/75	8/94	7/78	8/91	8/88
Total	288	288	207/314	189/291	221/351	201/312	227/355	221/345
Total Tons	2248	2248	1912/2019	1874/1976	1500/1630	1191/1302	1636/1764	1356/1480

Slashed Numbers = The first number refers to the level of pollutants with stringent controls to meet required air pollution regulations. The second number refers to the level of pollutants with controls at the 1971 level.

W = With offshore development
W/O = Without offshore development

Table 77

CAPE MAY COUNTY
Carbon Monoxide
(Tons)

Source	<u>1975</u>		<u>1980</u>		<u>1985</u>		<u>1990</u>	
	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>
Transportation								
Personal	13624	13624	11050	11050	5034	4182	5381	5208
Freight	754	754	1146	982	2610	1142	3752	1468
Total	14378	14378	12196	12032	7644	5324	9133	6676
Fuel Combustion								
Res. Nat. Gas	49	49	49	49	49	49	49	49
Res. Dist. Oil	130	130	168	168	195	197	232	233
Coml. Dist. Oil	50	50	78	78	106	106	141	141
Industrial Comb.	6	6	7	7	7	7	8	8
Total	235	235	302	302	357	359	430	431
Electric Utilities	186	186	285	285	285	285	285	285
Industrial Sources								
Coml. Printing								
Structural Clay								
Gas Refining								
Total								
Consumer Acting								
Dry Cleaning								
Use Of Paints								
Gasoline Service								
Station								
Total								
Total Tons	14799	14799	12783	12619	8286	5968	9848	7395

W = With offshore development

W/O = Without offshore development

Table 78
MONMOUTH COUNTY
Suspended Particulates
(Tons)

	<u>1975</u>		<u>1980</u>		<u>1985</u>		<u>1990</u>	
Source	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>
Transportation								
Personal	886	886	1218	1211	1532	1509	1937	1921
Freight	101	101	161	160	234	219	327	302
Total	987	987	1379	1371	1766	1728	2264	2223
Fuel Combustion								
Res. Nat. Gas	90	90	90	90	90	90	90	90
Res. Dist. Oil	552	552	617	613	693		773	765
Coml. Dist. Oil	305	305	370	370	420		485	480
Industrial Comb.	563/1046	563/1046	519/1453	519/1453	584/1701	584	600/2000	600/2000
Total	1510/1993	1510/1993	1596/2530	1592/2526	1787/2904	1775/2	1948/3348	1935/3335
Electric Utilities	1047	1047	1047	1047	1047	1047	1047	1047
Industrial Sources								
Coml. Printing								
Structural Clay								
Gas Refining								
Total								
Consumer Acting								
Dry Cleaning								
Use Of Paints								
Gasoline Service								
Station								
Total								
Total Tons	3544/4027	3544/4027	4022/4956	4010/4944	4600/5717	4550/5667	5259/6659	5205/6605

W = With offshore development
W/O = Without offshore development

Slashed Numbers = The first number refers to the level of pollutants with stringent controls to meet required air pollution regulations. The second number refers to the level of pollutants with controls at the 1971 level.

Table 79

MONMOUTH COUNTY
Sulfur Oxides
(Tons)

Source	<u>1975</u>		<u>1980</u>		<u>1985</u>		<u>1990</u>	
	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>
Transportation								
Personal	483	483	664	661	836	824	1058	1049
Freight	133	133	212	210	309	289	429	397
Total	616	616	876	871	1145	1113	1487	1496
Fuel Combustion								
Res. Nat. Gas	3	3	3	3	3	3	3	3
Res. Dist. Oil	1528	1528	1708	1698	1918	1898	2138	2118
Coml. Dist. Oil	610	610	740	740	840	830	970	960
Industrial Comb.	4564	4564	5538	5538	6255	6255	6600	6600
Total	7105	7105	7989	7979	9016	8986	9711	9681
Electric Utilities	-	-	8328	8328	8328	8328	8328	8328
Industrial Sources								
Coml. Printing								
Structural Clay	677/1304	677/1304	306/1531	306/1531	313/1581	313/1581	320/1620	320/1620
Gas Refining	-	-	-	-	3482/87000	-	3482/87000	-
Total	677/1304	677/1304	306/1531	306/1531	3795/88581	313/1581	3802/88620	320/1620
Consumer Acting								
Dry Cleaning								
Use Of Paints								
Gasoline Service								
Station								
Total								
Total Tons	8398/9025	8398/9025	17499/18724	17484/18709	22284/107070	18740/20008	23328/108146	19825/21125

W = With offshore development
W/O = Without offshore development

Slashed Numbers = The first number refers to the level of pollutants with stringent controls to meet required air pollution regulations. The second number refers to the level of pollutants with controls at the 1971 level.

Table 80

MONMOUTH COUNTY
Nitrogen Oxides
(Tons)

Source	<u>1975</u>		<u>1980</u>		<u>1985</u>		<u>1990</u>	
	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>
Transportation								
Personal	10332	10332	12584	12515	11020	10861	13937	13823
Freight	2149	2149	3424	3400	4991	4677	6944	6413
Total	12481	12481	16008	15915	16011	15538	20881	20236
Fuel Combustion								
Res. Nat. Gas	50	50	50	50	50	50	50	50
Res. Dist. Oil	212	212	237	236	267	264	297	294
Coml. Dist. Oil	1251	1251	1517	1517	1722	1702	1989	1968
Industrial Comb.	1496	1496	1348	1348	2095	2095	2390	2390
Total	3009	3009	3152	3151	4134	4129	4726	4702
Electric Utilities	-	-	13600	13600	13600	13600	13600	13600
Industrial Sources								
Coml. Printing								
Structural Clay								
Gas Refining								
Total								
Consumer Acting								
Dry Cleaning								
Use of Paints								
Gasoline Service								
Station								
Total								
Total Tons	15490	15490	32760	32666	33745	33267	39207	38538

W = With offshore development

W/O = Without offshore development

Table 81

MONMOUTH COUNTY
Hydrocarbons
(Tons)

Source	1975		1980		1985		1990	
	With	Without	With	Without	With	Without	With	Without
Transportation								
Personal	19439	19439	15085	15001	7826	7713	9897	9816
Freight	910	910	322	1312	1847	1731	2569	2373
Total	20349	20349	16406	16313	9673	9444	12466	12189
Fuel Combustion								
Res. Nat. Gas	39	39	39	39	39	39	39	39
Res. Dist. Oil	161	161	180	179	202	202	226	223
Coml. Dist. Oil	64	64	78	78	88	87	102	101
Industrial Comb.	64	64	84	84	95	95	105	105
Total	328	328	381	380	424	421	472	468
Electric Utilities	-	-	262	262	262	262	262	262
Industrial Sources								
Coml. Printing	60	60	82	82	5/97	5/97	5/105	5/105
Structural Clay	40/150	40/150	3/105	3/105	2/63	2/63	1/50	1/50
Gas Refining	-	-	-	-	-	-	-	-
Total	100/210	100/210	85/187	85/187	7/160	7/160	6/155	6/155
Consumer Acting								
Dry Cleaning	224	224	235	230	288	288	302	300
Use of Paints	1031	1031	882	879	749	743	647	643
Gasoline Service	819	819	95/1191	80/999	86/1070	83/1044	98/1226	97/1209
Total	2074	2074	1212/2308	1189/2108	1123/2107	1114/2075	1047/2175	1040/2152
Total Tons	22851/22961	22851/22961	18346/19544	18229/19250	11489/12626	11248/12362	14253/15530	13965/15226

W = With offshore development

W/O = Without offshore development

Slashed Numbers = The first number refers to the level of pollutants with stringent controls to meet required air pollution regulations. The second number refers to the level of pollutants with controls at the 1971 level.

Table 82

MONMOUTH COUNTY
Carbon Monoxide
(Tons)

Source	<u>1975</u>		<u>1980</u>		<u>1985</u>		<u>1990</u>	
	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>
Transportation								
Personal	156823	156823	126219	125523	54260	53474	68617	68058
Freight	7453	7453	11623	11541	16884	15823	23490	21696
Total	164276	164276	137842	137064	71644	69297	92107	89754
Fuel Combustion								
Res. Nat. Gas	101	101	101	101	101	101	101	101
Res. Dist. Oil	269	269	300	298	337	333	376	372
Coml. Dist. Oil	85	85	104	104	118	118	136	134
Industrial Comb.	128	128	170	170	193	193	213	213
Total	583	583	675	673	749	745	826	820
Electric Utilities	-	-	393	393	393	393	393	393
Industrial Sources								
Coml. Printing								
Structural Clay								
Gas Refining								
Total								
Consumer Acting								
Dry Cleaning								
Use of Paints								
Gasoline Service								
Station								
Total								
Total Tons	164859	164859	138910	138130	72786	70435	93326	90967
W	= With offshore development							
W/O	= Without offshore development							

Table 83
OCEAN COUNTY
Suspended Particulates
(Tons)

Source	<u>1975</u>		<u>1980</u>		<u>1985</u>		<u>1990</u>	
	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>
Transportation								
Personal	285	285	426	426	590	586	807	807
Freight	38	38	65	65	106	92	162	131
Total	323	323	491	491	696	678	969	938
Fuel Combustion								
Res. Nat. Gas	43	43	43	43	43	43	43	43
Res. Dist. Oil	267	267	325	325	400	404	476	480
Coml. Dist. Oil	180	180	280	280	380	380	505	505
Industrial Comb.	138	138	128	128	178	178	227	227
Total	628	628	776	1001	1005	1005	1251	1255
Electric Utilities								
Industrial Sources								
Periodicals								
Structural Clay								
Gas Refining								
Total								
Consumer Acting								
Dry Cleaners								
Use of Paints								
Gasoline Service								
Station								
Total								
Total Tons	951	951	1267	1267	1697	1683	2220	2193

W = With offshore development

W/O = Without offshore development

Table 84

OCEAN COUNTY
Sulfur Oxides
(Tons)

Source	<u>1975</u>		<u>1980</u>		<u>1985</u>		<u>1990</u>	
	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>
Transportation								
Personal	156	156	233	233	322	320	441	441
Freight	49	49	85	85	140	121	231	173
Total	205	205	318	318	462	441	672	614
Fuel Combustion								
Res. Nat. Gas	1	1	1	1	1	1	1	1
Res. Dist. Oil	739	739	899	899	1109	1119	1319	1329
Coml. Dist. Oil	360	360	560	560	760	760	1010	1010
Industrial Comb.	1181	1181	1570	1570	1927	1927	2762	2762
Total	2281	2281	3030	3030	3797	3807	5092	5101
Electric Utilities								
Industrial Sources								
Periodicals								
Structural Clay								
Gas Refining	-	-	-	-	1736/34000	-	3482/87000	-
Total	-	-	-	-	1736/34000	-	3482/87000	-
Consumer Acting								
Dry Cleaning								
Use Of Paints								
Gasoline Service								
Station								
Total								
Total Tons	2486	2486	3348	3348	5995/38259	4248	9246/92764	5715

W = With offshore development
W/O = Without offshore development

Slashed Numbers = The first number refers to the level of pollutants with stringent controls to meet required air pollution regulations. The second number refers to the level of pollutants with controls at the 1971 level.

Table 85

OCEAN COUNTY
Nitrogen Oxid.
(Tons)

Source	<u>1975</u>		<u>1980</u>		<u>1985</u>		<u>1990</u>	
	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>
Transportation								
Personal	3233	3233	4411	4411	4242	4220	5808	5808
Freight	796	796	1375	1375	2266	1953	3447	2797
Total	4029	4029	5786	5786	6508	6173	9255	8605
Fuel Combustion								
Res. Nat. Gas	24	24	24	24	24	24	24	24
Res. Dist. Oil	103	103	125	125	154	155	183	185
Coml. Dist. Oil	738	738	1148	1148	1558	1558	2071	2071
Industrial Comb.	303	303	348	348	481	481	605	605
Total	1168	1168	1645	1645	2217	2218	2883	2885
Electric Utilities								
Industrial Sources								
Periodicals								
Structural Clay								
Gas Refining								
Total								
Consumer Acting								
Dry Cleaning								
Use Of Paints								
Gasoline Service								
Station								
Total								
Total Tons	5197	5197	7431	7431	8725	8391	12138	11490

W = With offshore development

W/O = Without offshore development

Table 86

OCEAN COUNTY
Hydrocarbons
(Tons)

Source	1975		1980		1985		1990	
	With	Without	With	Without	With	Without	With	Without
Transportation								
Personal	2270	2270	5286	5286	3012	2997	4124	4124
Freight	337	337	530	530	839	723	1276	1035
Total	2607	2607	5816	5816	3851	3720	5400	5159
Fuel Combustion								
Res. Nat. Gas	19	19	19	19	19	19	19	19
Res. Dist. Oil	78	78	95	95	117	118	139	140
Coml. Dist. Oil	38	38	59	59	80	80	106	106
Industrial Comb.	15	15	19	19	22	22	24	24
Total	150	150	192	192	238	239	288	289
Electric Utilities								
Industrial Sources								
Periodicals	2	2	2	2	3	3	3	3
Structural Clay								
Gas Refining								
Total	2	2	2	2	3	3	3	3
Consumer Acting								
Dry Cleaning	270	270	240/357	240/357	268/439	269/0	303/496	304/499
Use Of Paints	545	545	543	543	566	568	641	644
Gasoline Service								
Station	255	255	30/339	30/339	35/390	34/388	43/483	43/483
Total	979	979	813/1239	813/1239	869/1395	871/1396	987/1620	991/1626
Total Tons	3738	3738	6823/7249	6823/7249	4961/5487	4833/5358	6678/7311	6442/7077

W = With offshore development
W/O = Without offshore development

Slashed Numbers = The first number refers to the level of pollutants with stringent controls to meet required air pollution regulations. The second number refers to the level of pollutants with controls at the 1971 level.

Table 87

OCEAN COUNTY
Carbon Monoxide
(Tons)

Source	<u>1975</u>		<u>1980</u>		<u>1985</u>		<u>1990</u>	
	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>	<u>With</u>	<u>Without</u>
Transportation								
Personal	50583	50583	44233	44233	20883	20777	28595	28585
Freight	2764	2764	4665	4665	7667	6607	11664	9461
Total	53347	53347	48898	48898	28550	27384	40259	38056
Fuel Combustion								
Res. Nat. Gas	49	49	49	49	49	49	49	49
Res. Dist. Oil	130	130	158	158	195	195	232	233
Coml. Dist. Oil	50	50	78	78	106	106	141	141
Industrial Comb.	22	22	28	28	31	31	35	35
Total	251	251	313	313	381	383	457	458
Electric Utilities								
Industrial Sources								
Periodicals								
Structural Caly								
Gas Refining								
Total								
Consumer Acting								
Dry Cleaning								
Use Of Paints								
Gasoline Service								
Station								
Total								
Total Tons	53598	53598	49211	49211	28931	27767	40716	38514

W = With offshore development
W/O = Without offshore development

Table 88

Air Pollution Level Percentage Increases from
Onshore Activity Resulting from Offshore Development*

ATLANTIC COUNTY

	SP	SO _x	NO _x	HC	CO
1980	5.0	56.0	8.0	4.4	8.3
1985	4.0	99.0	9.0	8.0	10.6
1990	1.8	89.0	3.4	4.1	4.7

CAPE MAY COUNTY

	SP	SO _x	NO _x	HC	CO
1980	0.8	0.3	0.4	2.0	1.3
1985	6.5	26.6	5.4	26.0	39.0
1990	3.6	51.0	6.1	21.0	33.0

MONMOUTH COUNTY

	SP	SO _x	NO _x	HC	CO
1980	0.2	00.0	0.2	0.6	0.5
1985	1.1	19.0	1.4	2.1	3.3
1990	1.0	18.0	1.7	2.1	2.6

OCEAN COUNTY

	SP	SO _x	NO _x	HC	CO
1980	0.0	0.0	0.0	0.0	0.0
1985	0.8	41.0	4.1	2.6	4.2
1990	1.2	62.0	5.6	3.7	5.7

*Measured by formula: $\left(\frac{W-W/O}{W/O}\right) \times 100$

W=Air pollution with offshore development.

W/O=Air pollution without offshore development.

period of development range from a low of 19 percent in Monmouth County in 1985 to a high of 99 percent in Atlantic County in 1985. Since the air quality in these counties is relatively good, even these increased levels would not be expected to create future problems. However, if the stringent pollution controls mentioned are not employed, much greater increases would result and significant air quality deterioration would be expected. Table 89 compares the levels of SO_x pollution emissions expected in the four counties to those of the U.S. and four major cities for the case in which stringent controls are applied and for the case in which they are not.

These results are based on a "worst case" assumption that all the gas discovered would require treatment for the removal of H_2S . Since most of the gas now used in the U.S. does not require treatment, it is probable that the actual increases in the SO_x levels will be less than those predicted by the analysis.

The only other significant increases occurred in the HC and CO levels for Cape May County for the years 1985 and 1990 which ranged from 21 percent to 39 percent. These increases are related to the additional trucking activity associated with the increase in the level of construction activity in the county (Table 90). The increases would not be expected to reverse the decline in HC

Table 89

Emissions of SO_x in the U.S., Major Cities,
and the Four New Jersey Coastal Counties

	Emissions (Tons)	Population	Square Mile Area	Emissions/ Capita	Emissions/ Area
U.S. (1971)*	32x10 ⁶	2.0x10 ⁸	3.5x10 ⁶	.160	9.1
U.S. (1985)*	18.4x10 ⁶	2.51x10 ⁸	3.5x10 ⁶	.074	5.3
Chicago (1971)*	1.04x10 ⁶	7.0x10 ⁶	3720	.149	279.6
Chicago (1985)*	.428x10 ⁶	8.5x10 ⁶	3720	.050	115.0
St. Louis (1971)*	.687x10 ⁶	2.3x10 ⁶	4118	.299	166.8
St. Louis (1985)*	.210x10 ⁶	2.87x10 ⁶	4118	.073	51.0
Baltimore (1971)*	.263x10 ⁶	2.1x10 ⁶	2259	.125	116.4
Baltimore (1985)*	.143x10 ⁶	2.57x10 ⁶	2259	.056	63.3
Denver (1971)*	.060x10 ⁶	1.26x10 ⁶	3660	.048	16.4
Denver (1985)	.154x10 ⁶	1.71x10 ⁶	3660	.090	42.1
Atlantic (1985)-W	7.16x10 ³	.189x10 ⁶	569	.038	12.6
Atlantic (1985)-W/O	3.6x10 ³	.184x10 ⁶	569	.020	6.3
Monmouth (1985)-W	22.3x10 ³	.572x10 ⁶	476	.039	46.8
Monmouth (1985)-W/O	18.7x10 ³	.567x10 ⁶	476	.033	39.3
Cape May (1990)-W	10.5x10 ³	.816x10 ⁵	267	.127	39.3
Cape May (1990)-W/O	6.9x10 ³	.795x10 ⁵	267	.089	25.8
Ocean (1990)-W	9.2x10 ³	.352x10 ⁶	642	.026	14.3
Ocean (1990)-W/O	5.7x10 ³	.354x10 ⁶	642	.016	8.9

SO_x Levels Resulting from Offshore Development with Claus but not
Tailgas Control on Gas Processing Plants

	Emissions (Tons)	Population	Square Mile Area	Emissions/ Capita	Emissions/ Area
Atlantic (1985)	92.4x10 ³	.189x10 ⁶	569	.490	162.4
Monmouth (1985)	106.9x10 ³	.572x10 ⁶	476	.187	224.8
Cape May (1990)	100.9x10 ³	.816x10 ⁶	267	1.120	378.0
Ocean (1990)	92.76x10 ³	.352x10 ⁶	642	.260	144.5

W = Offshore oil development with stringent controls on gas processing plant.

W/O = Without offshore oil development.

*SEAS regional emissions forecast base case

**1990 was used for Cape May and Ocean Counties to reflect the impact of gas processing plants which were not completed in these counties until after 1985.

Table 90

**PROJECTED CONSTRUCTION
Activity Increases**

**Sector 11 of the Harris Model
NEW CONSTRUCTION**

With Offshore Development
(Thousands of Dollars)

	ATLANTIC	CAPE MAY	MONMOUTH	OCEAN
1980	125,562	54,636	156,109	61,663
1985	96,162	68,176	183,739	68,683
1990	74,916	36,635	174,026	77,171

Without Development

	ATLANTIC	CAPE MAY	MONMOUTH	OCEAN
1980	53,163	21,675	131,294	61,724
1985	57,034	22,744	144,539	68,382
1990	62,050	24,214	161,474	76,830

Percentage Differences*

	ATLANTIC	CAPE MAY	MONMOUTH	OCEAN
1980	136.0	150.0	19.0	00.1
1985	70.0	200.0	27.0	00.1
1990	17.0	50.0	07.0	00.4

*Measured by following formula: $\frac{(W-W/O)}{W/O} \times 100$

W = Construction activity increases with offshore development

W/O = Construction activity increases without offshore development

and CO levels indicated in Table 76 and 77, but would succeed in decreasing the marginal rate of decline as shown in Table 91. The new levels generated as a result of offshore development would still be below those of 1975. Again, due to the relatively good air quality of the county, these increases would not be expected to significantly affect the existing situation.

The other percentage increases in air pollutant emissions for all four counties indicated in Tables 66 through 88 range from zero to 10.6 percent. Due to the relatively good air quality and the resultant high assimilative capacity of the four counties, these levels of increase would not be expected to significantly alter existing situations.

Water Pollution

Water pollution loadings were also calculated using the SEAS model. The economic model indicated only very small percentage differences in the industrial sectors for the with and without development scenarios. The base case and projected pollution levels for these were calculated by the SEAS model for the years studied and are shown as the same for both cases. Consumer activity related to water pollution loading increases were also determined by the SEAS model based on population and commercial activity levels supplied by the economic model using SEAS pollution coefficients. The increases in water pollutants after treatment are shown in Tables 92

Table 91

CAPE MAY COUNTY

Percentage Decreases from 1975 Levels in
HC and CO Emissions with Offshore Development

<u>Pollutant</u>	<u>1985</u>	<u>1990</u>
HC	33%	27%
CO	44%	33%

CAPE MAY COUNTY

Percentage Decreases from 1975 Levels in
HC and CO Emissions without Offshore Development

<u>Pollutant</u>	<u>1985</u>	<u>1990</u>
HC	47%	40%
CO	60%	50%

through 95 and the percentage changes are indicated in Table 96.

The results show that, other than the 10 percent increases in the levels of nitrates and phosphates in Cape May County in 1985, the changes in the levels of water pollutants are either negative or less than six percent. Increases of this magnitude would not be expected to require major modifications of the existing water treatment systems and would not significantly affect existing water quality.

The above-mentioned sources are categorized as point-sources. Water pollution resulting from non-point sources, such as surface runoff, are more difficult to quantify. This type of pollution which involves silt carried into streams, rivers and estuaries, creates problems ranging from plugged sewers to the loss of spawning grounds. The runoff from areas cleared for construction has a high delivery ratio (the fraction of on site sediment delivered to water bodies) in relation to that from cropland and other uses¹. Since the economic model shows increases of 50 to 200 percent in two of the four counties, Atlantic and Cape May (Table 90), surface runoff could create a significant source of water pollution. Actual volumes are not predictable, however, since they would depend on the local rainfall, soil type, and other factors.

¹Dr. A. E. Vandergrift, "Nonpoint Pollution and Planning" QMRI 1141, Kansas, Feb., 1974)

1975

Industrial Act
Consumer Activ

Total

1980

W:
Industrial Act
Consumer Activ

Total

W/O:

Industrial Act
Consumer Activ

Total

1985

W:
Industrial Act
Consumer Activ

Total

W/O:

Industrial Act
Consumer Activ

Total

W = With offsh
WO = Without o

Table 92

Water Pollution for Point Sources
(Measured in Tons)

ATLANTIC COUNTY

	BOD	SS	Heavy Metals	Ferrous Metals	Nitrates	Phosphates	Oil and Grease
<u>1975</u>							
Industrial Activity	529.0	564.0	1.2	--	32.8	13.3	247.1
Consumer Activity	1265.0	1868.0	--	--	1014.0	250.0	--
Total	1794.0	2432.0	1.2	--	1046.8	263.3	247.1
<u>1980</u>							
<u>W:</u>							
Industrial Activity	458.0	314.0	1.0	--	--	6.0	98.2
Consumer Activity	841.0	950.0	--	--	1014.0	248.0	--
Total	1299.0	1264.0	1.0	--	1014.0	254.0	98.2
<u>W/O:</u>							
Industrial Activity	458.0	314.0	1.0	--	--	6.0	98.2
Consumer Activity	797.0	900.0	--	--	960.5	235.0	--
Total	1255.0	1214.0	1.0	--	960.5	241.0	98.2
<u>1985</u>							
<u>W:</u>							
Industrial Activity	245.3	145.3	1.0	--	--	1.5	56.9
Consumer Activity	701.0	735.0	--	--	769.0	192.0	--
Total	946.3	880.3	1.0	--	769.0	193.5	56.9
<u>W/O:</u>							
Industrial Activity	245.3	145.3	1.0	--	--	1.5	56.9
Consumer Activity	689.2	721.8	--	--	755.8	188.3	--
Total	934.5	867.1	1.0	--	755.8	189.8	56.9

W = With offshore development

WO = Without offshore development

Table 93

Water Pollution for Point Sources
(Measured in Tons)

CAPE MAY COUNTY

	BOD	SS	Heavy Metals	Ferrous Metals	Nitrates	Phosphates	Oil and Grease
<u>1971</u>							
Industrial Activity	245.2	187.1	.01	--	--	--	91.1
Consumer Activity	--	822.0	--	--	370.5	91.0	--
Total	245.2	1009.1	.01	--	370.5	91.0	91.1
<u>1977</u>							
W:							
Industrial Activity	310.3	336.8	.01	--	--	--	116.1
Consumer Activity	259.0	370.0	--	--	401.0	78.0	--
Total	569.3	706.8	.01	--	401.0	78.0	116.1
W/O:							
Industrial Activity	310.3	336.8	.01	--	--	--	116.1
Consumer Activity	251.0	359.0	--	--	389.0	76.0	--
Total	561.3	695.8	.01	--	389.0	76.0	116.1
<u>1985</u>							
W:							
Industrial Activity	433.4	330.0	.01	--	--	--	161.1
Consumer Activity	191.0	243.0	--	--	464.0	52.0	--
Total	624.4	573.0	.01	--	464.0	52.0	161.1
W/O:							
Industrial Activity	433.4	330.0	.01	--	--	--	161.1
Consumer Activity	174.0	221.0	--	--	421.5	47.2	--
Total	607.4	551.0	.01	--	421.5	47.2	161.1

W = With offshore development

W/O = Without offshore development

Table 94

Water Pollution for Point Sources
(Measured in Tons)

MONMOUTH COUNTY

	BOD	SS	Heavy Metals	Ferrous Metals	Nitrates	Phosphates	Oil and Grease
<u>1975</u>							
Industrial Activity	296.5	544.4	2.4	234.2	38.6	10.6	88.7
Consumer Activity	2825.0	3056.0	--	--	2265.0	567.6	--
Total	3121.5	3600.4	2.4	234.2	2303.6	575.2	88.7
<u>1980</u>							
W:							
Industrial Activity	36.8	89.0	10.5	249.6	--	--	10.6
Consumer Activity	1465.0	1656.0	--	--	1747.0	432.0	--
Total	1501.8	1745.0	10.5	249.6	1747.0	432.0	10.6
W/O:							
Industrial Activity	36.8	89.0	10.5	249.6	--	--	10.6
Consumer Activity	1459.0	1649.0	--	--	1740.0	430.0	--
Total	1495.8	1738.0	10.5	249.6	1740.0	430.0	10.6
<u>1985</u>							
W:							
Industrial Activity	22.4	23.3	14.1	360.8	--	--	6.9
Consumer Activity	1082.0	1043.0	--	--	1144.0	285.0	--
Total	1104.4	1066.3	14.1	360.8	1144.0	285.0	6.9
W/O:							
Industrial Activity	22.4	23.3	14.1	360.8	--	--	6.9
Consumer Activity	1082.0	1033.0	--	--	1133.0	282.4	--
Total	1104.4	1056.3	14.1	360.8	1133.0	282.4	6.9

W = With offshore development

W/O = Without offshore development

Table 95

Water Pollution for Point Sources
(Measured in Tons)

OCEAN COUNTY

	BOD	SS	Heavy Metals	Ferrous Metals	Nitrates	Phosphates	Oil and Grease
<u>1971</u>							
Industrial Activity	179.3	19.6	2.9	-	-	-	8.1
Consumer Activity	-	2805.1	-	-	1262.1	311.0	-
Total	179.3	2824.7	2.9	-	1262.1	311.0	8.1
<u>1977</u>							
<u>W:</u>							
Industrial Activity	304.2	28.8	5.9	-	-	-	11.0
Consumer Activity	856.0	1226.5	-	-	1328.0	326.5	-
Total	1160.2	1255.3	5.9	-	1328.0	326.5	11.0
<u>W/O</u>							
Industrial Activity	304.2	8.8	5.9	-	-	-	11.0
Consumer Activity	856.0	1226.5	-	-	1328.0	326.5	-
Total	1160.2	1255.3	5.9	-	1328.0	326.5	11.0
<u>1985</u>							
<u>W:</u>							
Industrial Activity	329.3	34.7	10.5	-	-	-	15.1
Consumer Activity	593.0	750.0	-	-	1433.0	161.0	-
Total	922.3	784.7	10.5	-	1433.0	161.0	15.1
<u>W/O</u>							
Industrial Activity	329.3	34.7	10.5	-	-	-	15.1
Consumer Activity	595.0	753.0	-	-	1438.0	162.0	-
Total	924.3	787.7	10.5	-	1438.0	162.0	15.1

W = With offshore development

W/O = Without offshore development

Table 96

Water Pollution Level Percentage Increases for Point Sources from
Onshore Activity Resulting from
Offshore Development^a

Oil and
Grease

8.1

-

11.0

-

11.0

-

11.0

15.1

-

15.1

15.1

-

15.1

ATLANTIC
COUNTYBOD^bSS^cNITRATESPHOSPHATES

1980

3.4

4.1

5.6

5.4

1985

1.3

1.5

1.7

1.7

CAPE MAY
COUNTYBOD^bSS^cNITRATESPHOSPHATES

1977

1.4

1.6

3.1

2.6

1985

2.8

4.0

10.1

10.2

MONMOUTH
COUNTYBOD^bSS^cNITRATESPHOSPHATES

1980

.4

.5

.4

.5

1985

0

.9

1.0

.9

OCEAN
COUNTYBOD^bSS^cNITRATESPHOSPHATES

1977

0

0

0

0

1985

-.2

-.4

-.3

-.6

^a Measured by the formula, $\left(\frac{W - W/O}{W/O}\right) \times 100$

W = Water Pollution for Point Sources With Offshore Development

W/O = Water Pollution for Point Sources Without Offshore Development

^b Five-day Biological Oxygen Demand

^c Suspended Solids

Summary

In summary, analysis of the population, industrial and commercial sector information supplied by the economic model using both the SEAS model and other available sources, indicates that: 1) Sulfur oxide emissions could increase to a level producing significant deterioration of air quality if stringent controls are not placed on gas processing plants, while other air pollutant emissions are not expected to increase enough to warrant serious concern. 2) Point source water emissions are not likely to increase significantly as a result of offshore development. 3) Non-point source pollution, exemplified by surface runoff from construction sites, may be significant although actual quantities cannot be estimated.

Limitations

This study was limited by time and funding to the four New Jersey counties that were indicated by the economic model as experiencing the greatest percentage changes in industrial sector activity and in population. It was also limited by the level of aggregation provided by the output of the economic model. However, the SEAS model did have its own file of economic activity related to pollution levels for most industries which allowed the analysts to disaggregate the 99 sectors into the required 185 sectors and make the necessary estimates.

Future Use

The SEAS model has additional capabilities involving solid waste pollution, land use, energy, and abatement costs that were not employed in this study. The background data sources used to develop the model are also available. These contain information on the air, water, and solid waste generated by particular industries, commercial activities and the various types and degree of effectiveness of pollution control technologies. All of these would be available for any future use. With more time and funding many more counties could be examined which could indicate some of the more subtle changes occurring. More information could be developed as to the effects of particular industries on specific areas such as ^{an} SMSA. The SEAS model has been found to be the only system in existence which can integrate all the variables of industrial and commercial levels of activity, population changes, and pollution control technology. When used with the economic ^{model,} it can be a valuable tool for assessing complex "onshore" environmental related changes that could be related to a potential OCS sale.

Full documentation of the SEAS model is available from:

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CONCLUSIONS

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The economic study described within this Technical Paper has been based upon a realistic set of assumptions that would represent a high impact case should the actions as described in the Draft Environmental Impact Statement for Sale Number 40 be taken. It should be remembered, however, that the set of assumptions used is hypothetical and represents only one of many possible development scenarios that could occur should the proposed sale take place. The use of the economic model allows the consideration of as many significant and relevant factors as possible within a given limit of time. Furthermore, the use of the economic model allows the utilization of a comprehensive and consistent data base that eliminates the duplication of a data gathering effort that has already been made. The analyst can concentrate efforts on the specific assumptions relative to the action under consideration and the factors that could determine future impacts. It is hoped that the efforts undertaken will lead to a greater understanding of what could occur should the proposed action be taken.

This economic study of the potential impacts of a possible Baltimore Canyon Sale Number 40 indicates that the impacts on the region as a whole should be minor. Major impacts, however, could be felt by several primary impact counties. Potential

problems for these localities include an overextension of economic activity due to the large influx of factors of production into these areas during the early years of Baltimore Canyon activity and the subsequent out migration of these factors of production during the later years. Some waste problems could also be created by heavy construction activity and subsequent solid waste runoff and by gas processing activity should inadequate treatment of air emissions occur.

Our analysis has indicated that a decision to invest in the Baltimore Canyon would create economic opportunity for labor, capital, and materials and provide the incentive for the subsequent movement of these factors of production to areas of high economic opportunity. The ability of a particular area to utilize the influx of these factors of production is dependent upon the population levels and the industrial base existing within the locality. For purposes of writing an environmental impact statement the study area has been classified into groups that reflect the level of population density and industrialization. Generic inferences have been made from our economic study with regard to the trends and impacts that may be expected on the types of counties found within the region. Examples of counties falling within each classification have been provided.

The use of the economic model requires the analyst to trace the logistics of the exploration, development, and production processes and the ensuing flow of oil and gas to shore and the required economic activity needed to support Baltimore Canyon activity. In preparing input for the economic model, particular attention was given to the primary activities that would be required to be introduced into the area. The nature of the economic model and its use in our economic study has allowed us to determine that new economic activity in the machines and miscellaneous manufacturing sectors is possible in Cape May County, New Jersey. All other induced changes of secondary industries are expected to occur in industries already found in the area.

It is only possible to discuss in a consistent manner the impacts of a potential action on the physical, biological, and human environment if the extent and nature of economic activity (including induced effects) is known. The economic model has served a basic purpose in that the impacts on the physical, biological, and human environment were estimated only after knowing the extent and nature of the economic activity that could stem from the action. The information needed to perform this analysis was obtained not only from the output of the economic model but from the formulation of the hypothetical scenario required to run the economic model. The formulation of inputs

into the economic model is a learning process that clarifies the alternatives, problems, and logistics that could be expected from the proposed action. This measure of possible direct economic activity has been used as a basis for determining the secondary impacts upon the natural and socio-economic environment.

One of the most obvious such uses has been presented in Chapter IV where the application of the output of the economic model in the determination of air and water quality impacts has been discussed. As was indicated, total impacts to air or water quality can be measured only by determining possible induced population levels and economic activity which result in emissions or discharges of pollutants.

Similarly, implications for land use, including possible competition for available open space, the potential for endangering fragile areas, and the introduction of incompatible uses into an area (assuming that land use controls cannot fully counter economic pressures) cannot be addressed without an estimate being made of the amount of induced economic activity and population changes anticipated for a region. Utilizing the output of the economic model, implications have been drawn with regard to not only the levels of possible induced economic activity that could be expected, but also the general locations within a

region which could be expected to receive these induced effects.

For example, the introduction of gas processing plants into several localities within the Mid-Atlantic coastal region, was found by the economic model, to stimulate an increase in petrochemical activity in areas where petrochemical activity presently exists and not where the plants were hypothetically located. This result of the economic model suggests that either existing firms increase capacity utilization, expand capacity on site, or increase the number of petrochemical plants in areas already containing this activity. In any case, existing industrial development trends can be expected to be heightened as opposed to the construction of new firms taking place in areas where they previously did not exist. Planners are therefore alerted to possible increased stresses on the assimilative capacity of the environment in areas where petrochemical activity already exists.

Increases in economic activity, population levels, the demands placed upon infrastructure (such as sewer and water systems), and pollution loadings have implications for the less tangible aspects of land use and natural systems including fragile biological and watershed systems. These impacts cannot be quantified by the use of the economic model but the levels and types of activities which might be stimulated in particular areas of a region can be predicted. Combining this information

with a knowledge of existing conditions and pressures within the region, it is possible to indicate those areas which would be most sensitive to possible activities stemming from a proposed action. This identification process, although not allowing us to quantify or pinpoint the location of these less tangible impacts, does allow us to address them in a more meaningful manner than would otherwise be possible. In addition it gives State and local governments, as well as concerned public groups, a starting point for the identification of further study needs and/or planning needs which can be addressed once some of the uncertainties inherent at this stage are removed.

One of the most important uses of the economic model was the generation of demographic data that was consistent with projected levels of economic activity. Population growth can result in socio-economic, socio-cultural, and infrastructure impacts that affect the quality of life experienced by persons in the study area. Some of the results of this study were used to draw some conclusions regarding OCS induced population growth within the statement. From a regional perspective the affects of OCS development on population growth, as a result of the proposed sale, were found to be minimal. Results of the study showed that during the peak employment year of 1986, the regional population

would reach 33.2 million people under both scenarios. By 1990, (the year in which OCS operations from the proposed 1976 Baltimore Canyon Sale Number 40 are expected to subside) the population under both cases would reach 35.1 persons. Over the 15 year period, 1975 to 1990, for both cases, the population increased by 22.2 percent which reflects an average annual growth rate of 1.5 percent. The results did show an actual difference in the growth rate, but it was much less than one-hundredth of a percent.

The increase in the regional population under the with development scenario ranged between approximately 11,300 (1980) and 7040 persons (1985) above the without development scenario. The 1980 high of 11,300 persons would only account for six-tenths percent of the regional population growth that took place between 1975 and 1980, and would account for much less than a thousandth percent of the total regional population projected for that year. By 1990, according to results of the economic model, there would be approximately 8700 persons attributable to OCS related activity within the region. The highest ratio obtained by the economic model between the increase in civilian employment and the increase in population was applied to estimate the possible maximum population increases of from 5600 to 20,000 persons for the region as a whole. Regional population changes

were therefore considered negligible causing no change in the demographic characteristics or trends in the region.

On a local level OCS induced population growth was found to have the greatest effects in areas with low population density and limited industrialization. As a result of the proposed Baltimore Canyon Sale Number 40 , it is expected that primary counties, those having major onland support facilities (operations bases, pipeline terminals, gas processing plants) would show population increases during the early phases of development as a result of intra and extra regional net in-migration. Surrounding counties depending upon their local economy would be expected to lose population as persons sought greater employment and related opportunities in primary OCS counties or gain population as economic activity needed to support Baltimore Canyon activity increased.

Those primary counties showing early population increases would be expected to lose population as increased economic activity occurs in other areas during the later years. Population increases which may be experienced by primary counties would be expected to taper off in the later operational years as the surplus population follows economic opportunity elsewhere.

Results of the economic model showed that in Atlantic County, for example, with OCS development, between the initial years of development and 1980, the population increased by 12,800 persons. OCS induced

growth accounted for almost 80 percent of this growth. Between 1980 and 1985, under the development scenario, the population of Atlantic County declined by three-tenths of a percent. By 1990 the results showed a population increase, but it was only two percent above the 1985 figure. During the 15 year period of development the county's population showed an overall increase of nine percent. The OCS induced population remaining in the county accounted for only 21 percent of that growth (as compared to 80 percent of the growth during the initial development years).

The impact of OCS induced growth, as a result of proposed Baltimore Canyon Sale Number 40, upon demographic trends and characteristics at the county level is largely contingent upon 1) the magnitude of OCS induced growth, 2) the size of the existing population, 3) the diversification of its economic base, 4) the urban-rural nature of the county and other socio-cultural characteristics, and 5) the capabilities and limitations of the existing physical and service infrastructure. OCS induced population growth in Atlantic county, as indicated by the output of the economic model could result in adverse impacts in that county. The same level of OCS induced growth would be negligible in New York County (Manhattan), while in Northampton County, Virginia it would severely alter the existing

demographic characteristics, greatly overburden the existing infrastructure system, and produce pronounced socio-cultural conflicts.

In providing a further description of our application of the data generated by the economic model in the concluding section of this study, we have tried to demonstrate the importance of maintaining a consistency with regard to the level of economic activity and the impacts that could be expected from a particular action. One of the most crucial elements of an impact analysis is the use of a data base that is consistent. Without this consistency, differences that appear in the results may in actuality be attributable to differences in the data collected, which in comparing scenarios may be misinterpreted as a measurable difference between the scenarios used and an actual impact. The use of the economic model allows a consistent base of economic and demographic data to be used. The impacts derived may in this case be attributed to the differences between alternative scenarios and the assumptions used as input to the economic model. The results of the economic model have been utilized in estimating the impacts that could be expected should a proposed sale occur, flagging some of the potential onshore problems that could stem from a proposed sale, and providing a greater understanding of the factors that could determine environmental impacts.

